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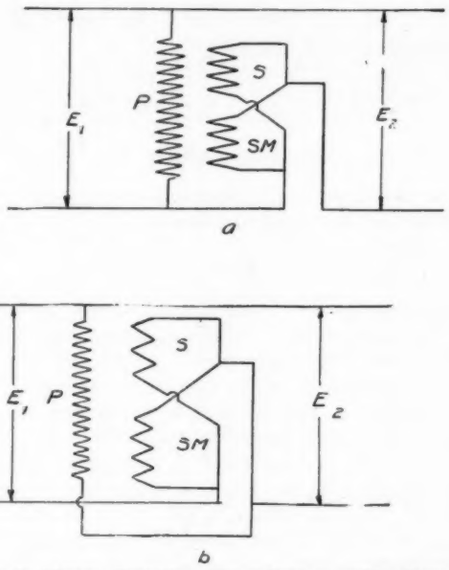

Fig. 1.—Single-Phase Boosting Transformer with Secondary Coils in Parallel.

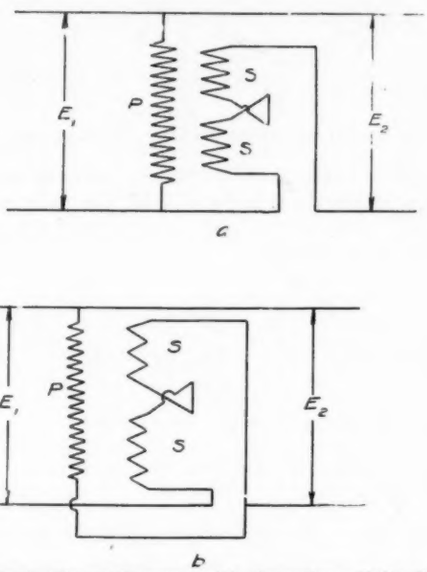

Fig. 2.—Single-Phase Booster with Secondary Coils Connected in Series.

Principles of Booster Transformers

The Elements of Boosting and Choking by Transformers—Formulas for Finding the Percentage of Boosting and Choking of Single-Phase and Polyphase Transformers Under Different Conditions

By C. M. JANSKY

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IT IS quite common practice to use transformers for temporarily boosting the voltage to compensate for line drop. Tables have been prepared showing the percentage of boosting obtained by using transformers of different ratios and different connections. The writer, however, has been able to find in print very little of the fundamental principles of calculating the boosting effect under different conditions. This may be due to the fact that the principles are quite simple, and hence explanations may seem unnecessary. Nevertheless, they are often misunderstood and, as some of the tables are inaccurate, an analysis of the principles may be appropriate.

The time-phase difference between the primary and secondary voltages of a transformer is one-half a period. If we represent the two voltages by vectors on a clock diagram they are 180° apart. It is thus evident that when the primary and secondary windings of a transformer are connected in series, their electromotive forces will be either added together or subtracted one from the other, depending upon the connections employed. This is the fundamental principle of the booster and choke transformer.

The percentage of boosting or choking will be determined by the manner in which the coils are interconnected, and will also depend upon the interconnection of the circuits.

The simpler connections of single-phase transformers for boosting the voltage are shown in Figs. 1 and 2. In Fig. 1a the secondaries are connected in parallel and one end of the primary winding is connected directly to the secondary and the other end of the secondary winding is then connected to the line. The voltage across the line on the secondary side is the algebraic sum of the primary and secondary voltages. This is known as straight or simple boosting. The connections shown in Fig. 1b differ from those in 1a in that the primary is connected to the far side and the booster itself is subjected to the boosted voltage. Fig. 2 shows similar connections for the secondary coils in series.

Percentage of Boosting.—The percentage of boosting may be calculated as follows:

Let R = ratio of transformation,
E_1 = primary voltage,
E_2 = secondary or load voltage.

The percentage of boosting will depend upon the connections employed, hence two cases must be considered. When the connections of Fig. 1 (a) are used, the secondary voltage is evidently given by

$$E_2 = E_1 + \frac{E_1}{R} = E_1\frac{R+1}{R} \quad \ldots\ldots (1)$$

and percentage boosting $= \frac{E_2 - E_1}{E_1} \times 100 = \frac{100}{R}$ .... (2)

When the connections shown in Fig. 1 (b) are employed the secondary pressure is given by

$$E_2 = E_1 + \frac{E_2}{R}$$

$$\text{or } E_2 = \frac{E_1 R}{R-1} \quad \ldots\ldots (3)$$

The percentage of boosting $= \frac{E_2 - E_1}{E_1} \times 100 = \frac{100}{R-1}$ (4)

Example.—A transformer whose ratio is 10 to 1 is used as an augmented booster. If the primary voltage is 2200, what is the load voltage, and what is the percentage of boosting?

Since $E_2 = \frac{E_1 R}{R-1}$

we have $E_2 = \frac{2200 \times 10}{9} = 2444$ volts.

Percentage boosting $= \frac{100}{9} = 11.1\%$.

The percentage of boosting by a simple booster would be 10%.

Booster Transformer on Polyphase Circuits.

The effect of boosting transformers on polyphase systems will be modified by the connections employed.

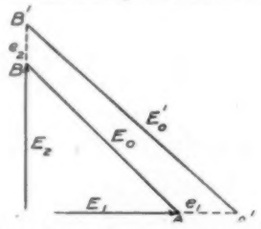


Fig. 3.—Three-Wire, Two-Phase Booster Diagram.

Since a four-wire two-phase system is the same as two single-phase systems, the process of calculating the boosting effect on such a system is exactly like that on single-phase circuits.

When three-wire two-phase systems are used the boosters are inserted into the outside wires. The percentage of boosting between either outside wire and

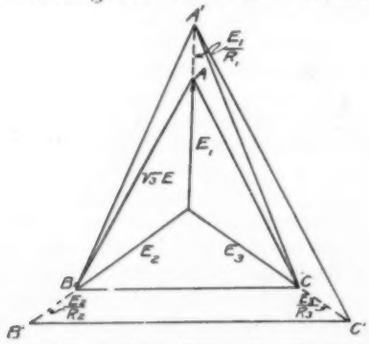


Fig. 4.—Y-Connected Three-Phase Network with One Phase Boosted.

the neutral is the same as for single-phase circuits. The increase in the voltage between the outside wires will be the same percentage as the phase voltages when these are boosted the same percentage. If, however, the phase voltages are raised by different amounts, then the voltage between the outside wires will also be increased by a different percentage. In Fig. 3, let $OA = E_1$ and $OB = E_2$ be the phase voltages, and let E_1 be boosted by E_1/R_1 and E_2 by E_2/R_2. Since $E_1 = E_2$

$$A'B' \text{ or } E_0' = \sqrt{\left(E_1 + \frac{E_1}{R_1}\right)^2 + \left(E_1 + \frac{E_1}{R_2}\right)^2}$$

$$= E_1\sqrt{2 + \frac{2}{R_1} + \frac{2}{R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} \quad \ldots\ldots (5)$$

And percentage of boosting

$$= \frac{100}{\sqrt{2}}\left\{\sqrt{2 + \frac{2}{R_1} + \frac{2}{R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} - \sqrt{2}\right\} \quad \ldots\ldots (6)$$

When $R_1 = R_2$, this reduces to $\frac{100}{R}\%$. When $R_1 = \infty$, or when only one phase is boosted, then the percentage of boosting becomes

$$\frac{100}{\sqrt{2}}\left\{\frac{1}{R}\sqrt{2R^2 + 2R + 1} - \sqrt{2}\right\} \quad \ldots\ldots (7)$$

By substituting $R-1$ for R, the above formulas will give the percentage boosting when the augmented booster connections are used.

The calculation of the boosting effect in a three-phase system is not so simple as in the single-phase system and it also depends upon the type of circuits employed. In a Y-connected four-wire system, each phase voltage may be boosted separately by connecting a booster into the phase wire. In this case the percentage boosting is calculated in exactly the same way as for single phase.

The effect of the booster on the voltage between phase wires may be calculated by the aid of Fig. 4, where E_1, E_2 and E_3 represent the voltages between phase wires and neutral, and AB, BC and CA represent the phase voltages, respectively. When E_1 is boosted the voltages between A and B, C and A, are both increased the same percentage, while that between B and C is unaffected. Now

$$(A'B)^2 = E_2^2 + \left(E_1 + \frac{E_1}{R_1}\right)^2 - 2E_2\left(E_1 + \frac{E_1}{R_1}\right)\cos 120°$$

$$= E_2^2 + E_1^2 + \frac{2E_1^2}{R_1} + \frac{E_1^2}{R_1^2} + E_2E_1 + \frac{E_1E_2}{R_1}$$

$$= E_1^2 + E_1^2 + \frac{2E_1^2}{R_1} + \frac{E_1^2}{R_1^2} + E_1^2 + \frac{E_1^2}{R_1}$$

$$= 3E^2 + \frac{3E_1^2}{R_1} + \frac{E_1^2}{R_1^2}$$

$$= 3E_1^2\left(1 + \frac{1}{R_1} + \frac{1}{3R_1^2}\right)$$

Therefore $A'B = \sqrt{3}\ E_1\sqrt{1 + \frac{1}{R_1} + \frac{1}{3R_1^2}}$

and the percentage boost

$$= \left(\frac{1}{\sqrt{3R}}\sqrt{3R^2 + 3R + 1} - 1\right)100 \text{ per cent} \ldots (8)$$

If E_3 is boosted the same per cent as E_1, it is evident that the voltage between C and A is boosted the same per cent. The percentage boost for BC is given by (8).

The boosting of the voltage of one phase of a three-wire three-phase system affects the voltage in two phases, but to a different extent; and when the voltage of two phases is boosted, all three are boosted, but no two alike. The connections for a simple three-wire three-phase booster are shown in Fig. 5. The relations between the line voltages on the generator side are represented by the equilateral triangle, Fig. 6, where E_1, E_2 and E_3 represent the voltages between lines AB, BC and CA, respectively. Suppose that the

ratios of transformers 1, 2 and 3 are R_1, R_2 and R_3, respectively; then each phase voltage will be boosted a different amount and the resulting load voltages will be represented by the triangle $A^1B^1C^1$, Fig. 6.

Let $e_1 = \frac{E_1}{R_1}$

$e_2 = \frac{E_2}{R_2}$

and $e_3 = \frac{E_3}{R_3}$

Then $(E_1^1)^2 = (E_1 + e_1)^2 + e_2^2 - 2e_2(E_1 + e_1)\cos 120^\circ$

$= (E_1 + e_1)^2 + e_2^2 + e_2(E_1 + e_1)$

Likewise $(E_2^1)^2 = (E_2 + e_2)^2 + e_3^2 + e_3(E_2 + e_2)$

and $(E_3^1)^2 = (E_3 + e_3)^2 + e_1^2 + e_1(E_3 + e_3)$

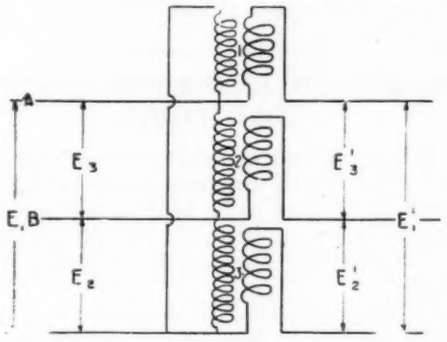


Fig. 5.—Connections of a Simple Delta-Connected Three-Phase Booster.

Since $E_1 = E_2 = E_3$, the subscripts may be dropped and upon substituting E/R_1 for e_1, E/R_2 for e_2, and E/R_3 for e_3, and reducing we get

$$E_1' = E\sqrt{1 + \frac{2}{R_1} + \frac{1}{R_2} + \frac{1}{R_1R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} \quad \ldots\ldots (9)$$

The percentage of boosting becomes

$$100\left\{\sqrt{1 + \frac{2}{R_1} + \frac{1}{R_2} + \frac{1}{R_1R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} - 1\right\} \ldots\ldots (10)$$

In the same way,

$$E_2' = E\sqrt{1 + \frac{2}{R_2} + \frac{1}{R_3} + \frac{1}{R_2R_3} + \frac{1}{R_2^2} + \frac{1}{R_3^2}} \quad \ldots\ldots (11)$$

and $$E_3' = E\sqrt{1 + \frac{2}{R_3} + \frac{1}{R_1} + \frac{1}{R_1R_3} + \frac{1}{R_1^2} + \frac{1}{R_3^2}} \quad \ldots\ldots (12)$$

The percentage of boosting may be calculated by formulas similar to formula (10).

In many cases these formulas can be simplified, as when R_2 and $R_3 = \infty$, from (9) we have

$$E_1' = E\sqrt{1 + \frac{2}{R_1} + \frac{1}{R_1^2}} = E\sqrt{\frac{R_1^2 + 2R_1 + 1}{R_1^2}}$$

$$= \frac{E(R_1 + 1)}{R_1} \quad \ldots\ldots (13)$$

and percentage of boosting

$$= \frac{100}{R_1} \text{ as for single phase} \quad \ldots\ldots (14)$$

In the same case (when R_2 and $R_3 = \infty$) substituting in (11) we find $E_2^1 = E$
and percentage of boosting is zero; in the same case, substituting in (12) we find

$$E_3' = E\sqrt{1 + \frac{1}{R_1} + \frac{1}{R_1^2}}$$

$$= \frac{E}{R_1}\sqrt{R_1^2 + R_1 + 1} \quad \ldots\ldots (15)$$

and percentage of boosting is

$$100\left\{\frac{\sqrt{R^2 + R + 1}}{R} - 1\right\} \quad \ldots\ldots (16)$$

When $R_1 = R_2$ and $R_3 = \infty$, then from (9) we find $E_1' = E\sqrt{1 + \frac{3}{R_1} + \frac{3}{R_1^2}}$

$$= \frac{E}{R}\sqrt{R^2 + 3R + 3} \quad \ldots\ldots (17)$$

and percentage of boosting is

$$100\left\{\sqrt{1 + \frac{3}{R_1} + \frac{3}{R_1^2}} - 1\right\} \quad \ldots\ldots (18)$$

also from (11) $E_2' = E\sqrt{1 + \frac{2}{R_2} + \frac{1}{R_2^2}}$

$$= E\sqrt{\frac{R_2^2 + 2R_2 + 1}{R_2^2}} = \frac{E(R + 1)}{R}$$

and percentage of boosting is $\frac{100}{R}$.

also from (12) $E_3' = E\sqrt{1 + \frac{1}{R_1} + \frac{1}{R_1^2}}$

$$= \frac{E}{R_1}\sqrt{R_1^2 + R_1 + 1}$$

and percentage of boosting is

$$100\left\{\frac{1}{R}\sqrt{R^2 + R + 1} - 1\right\} \quad \ldots\ldots (20)$$

When $R_1 = R_2 = R_3$, it is evident that $E_1^1 = E_2^1 = E_3^1$ and that the percentage of boosting is the same for each phase and is given by formula (18) above.

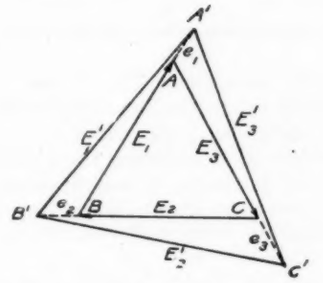


Fig. 6.—General Case of a Delta Three-Phase Booster with Unequal Boosting of Each Phase.

The same formulas may be used for calculating the boosting effect when augmented booster connections are used. It is only necessary to change R to $(R - 1)$.

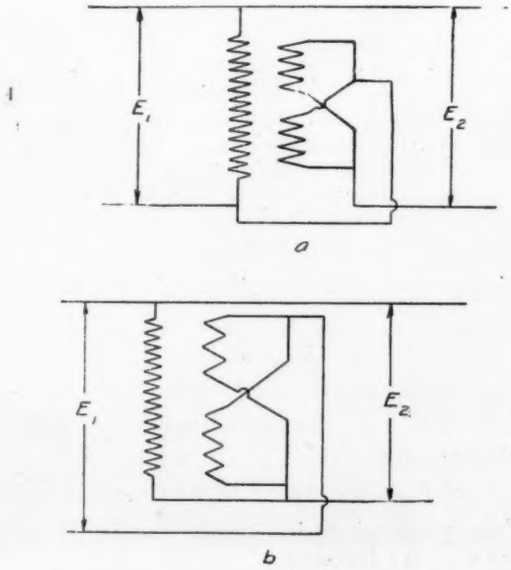


Fig. 7.—Single-Phase Choking Transformer with Secondary Coils in Parallel.

CHOKING CONNECTIONS.

If the secondary winding is connected so that its voltage opposes the primary voltage, the line voltage will be reduced. A transformer so connected is known

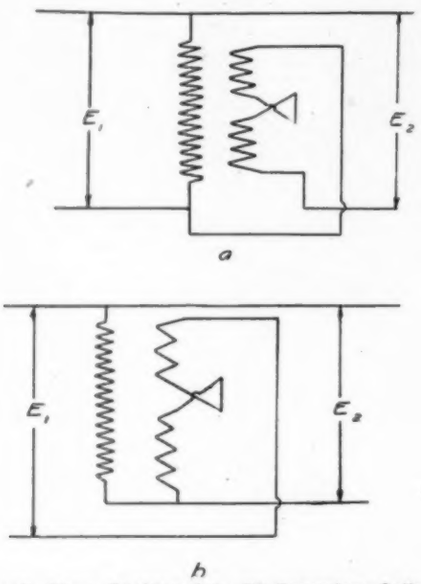


Fig. 8.—Single-Phase Choking Set with Secondary Coils in Series.

as a choking transformer. The connections for choking that correspond to the boosting connections, Figs. 1 and 2, are shown in Figs. 7 and 8.

The methods of calculating the choking effect are the same as for boosting. When the connections are as shown in Fig. 7 (a) the load voltage $E_2 = E_1 - \frac{E_1}{R}$

$$= \frac{E_1 (R-1)}{R}$$

$$\text{Percentage choking} = 100 \left\{ \frac{E_1 - \frac{E_1 (R-1)}{R}}{E_1} \right\} = \frac{100}{R} \quad \ldots\ldots (21)$$

When the connections are as shown in Fig. 7 (b) the load voltage is $E_2 = E_1 - \frac{E_2}{R}$

$$= \frac{E_1 R}{R+1}$$

$$\text{Percentage of choking} = \frac{100}{R+1} \quad \ldots\ldots\ldots\ldots\ldots (22)$$

A brief analysis will show that the formulas for the effect of boosting in polyphase systems may be used for calculating the diminishing effect, provided the terms containing the first powers of R have their signs changed. Thus the choking formulas for a three-wire two-phase system become

$$E_0' = E_1 \sqrt{2 - \frac{2}{R_1} - \frac{2}{R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} \quad \ldots\ldots\ldots\ldots (23)$$

and percentage choking

$$= \frac{100}{\sqrt{2}} \left\{ \sqrt{2 - \frac{2}{R_1} - \frac{2}{R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} - \sqrt{2} \right\} \quad \ldots\ldots (24)$$

Formulas (23) and (24) correspond to (5) and (6) for boosting.

When $R_1 = R_2 = R$, (24) reduces to $-\frac{100}{R}\%$.

When one phase alone is choked, that is, either R_1 or $R_2 = \infty$, (24) becomes

$$\frac{100}{\sqrt{2}} \left\{ \frac{1}{R} \sqrt{2R^2 - 2R + 1} - \sqrt{2} \right\} \quad \ldots\ldots\ldots\ldots (25)$$

In the same way, the formulas (9), (11) and (12) for boosting on three-wire three-phase circuits upon changing signs become

$$E_1' = E \sqrt{1 - \frac{2}{R_1} - \frac{1}{R_2} + \frac{1}{R_1 R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} \quad \ldots\ldots (26)$$

$$E_2' = E \sqrt{1 - \frac{2}{R_2} - \frac{1}{R_3} + \frac{1}{R_2 R_3} + \frac{1}{R_2^2} + \frac{1}{R_3^2}} \quad \ldots\ldots (27)$$

$$E_3' = E \sqrt{1 - \frac{2}{R_3} - \frac{1}{R_1} + \frac{1}{R_1 R_3} + \frac{1}{R_1^2} + \frac{1}{R_3^2}} \quad \ldots\ldots (28)$$

and percentage choking for (26) becomes

$$= \left\{ 1 - \sqrt{1 - \frac{2}{R_1} - \frac{1}{R_2} + \frac{1}{R_1 R_2} + \frac{1}{R_1^2} + \frac{1}{R_2^2}} \right\} 100$$

When $R_1 = R_2 = R_3 = R$, the percentage choking is the same for each phase and is given by

$$\left\{ 1 - \frac{1}{R} \sqrt{R^2 - 3R + 3} \right\} 100$$

NATIONAL CONFERENCE ON INDUSTRIAL CONDITIONS.

The vital problems of business, multiplied by post-war and industrial developments, will be discussed at a national conference to be held in Chicago on Sept. 8 and 9 under the auspices of the Illinois Manufacturers' Association. The sessions will be at the Congress Hotel.

Trade and industrial associations in every line have been invited to appoint delegates, and to participate in what is believed will be a meeting of moment, inasmuch as it will enable business to present concretely its attitude on some of the questions now before the lawmakers at Washington and some of the proposals of a revolutionary nature that have been presented from various sources in the past few months.

Representation is to be given at the conference not only to business, but to the farming interests, since it is pointed out that agriculture, after all, is one of the greatest businesses of the country. The farmer has his capital invested in land, he is an employer of labor and he is concerned with the maintenance of conditions which will permit him to obtain a fair return upon his investment and his management of his enterprise.

Leaders of organized labor have also been invited to state where the demands of workers are going to stop.

Some of the subjects which it has been suggested be discussed at the conference are the following:

Participation in private business on the part of the Federal Government.

Nationalization of industry.

Influence of exports on prices and production.

Possibilities of increasing production.

The relation of the United States to the rehabilitation of industry in Europe.

Stabilization and guarantee of contracts.

Definition of profiteering.

The attitude of employing farmers and manufacturers to labor.

Adjustment between property rights and community interests.

Participation of labor in the management of industry.

Increasing the purchasing power of the dollar.

Distribution of the war debt.

Governmental price fixing.

The Plumb plan.

The solidarity of farming and business interests.

Use of Industrial Electric Trucks and Tractors in Warehouses

Advantages of this Class of Apparatus in Storage Buildings and Warehouses of All Sorts — Difficulties Encountered in Application — Analysis of Handling Operations—Special Advantages for Utility Service

By BERNARD J. DILLON

THIS is the third of a series of articles dealing with the application of industrial electric trucks and tractors in representative industries. In this the application of such equipment to the handling problems of warehouses and storage places of all types is described. The particular advantages which their introduction for this work offers and the more common difficulties encountered are pointed out and the handling operations of this industry are carefully analyzed. In addition the article calls attention to the use of this apparatus for general utility work in such places.

WAREHOUSES of all sorts, including storage, cold storage, wholesale houses, etc., are generally considered as offering one of the best fields for the application of the electric industrial truck and tractor. This is due to the nature of this business and the conditions that exist in it.

The function of such places, as far as this article is concerned is one of receiving, storing and delivery or distribution. This involves several handling operations, unloading from a carrier into the warehouse, locating it in the warehouse and loading it again onto a carrier to be transferred to its destination. To these may be added, as in the case of wholesale or jobbing houses, other packing, assembly, or similar minor manufacturing operations.

Handling the goods is of course one of principal items entering into the cost of conducting a warehousing or storage business. Not that the cost of this operation is any greater in this business than in others but it does constitute a greater percentage of the total expense, and any saving that can be affected in it therefore, is much more readily appreciated. For example, a 50% reduction in the cost of handling in a warehouse may effect a 20% reduction in the total operating expenses, whereas, a similar saving in handling in an industrial will only result in a saving of perhaps 2% in the total expense. Furthermore, handling is about the only major operation in warehousing that lends itself readily to improvement by the application of efficiency methods—the other items, investment, insurance, overhead, light, heat and power, being either fixed or largely controlled from outside sources.

The labor problem is also a factor that adds to the value of electric apparatus for such work at the present time. Unskilled labor, such as is used in

The 9th Street Terminal Warehouse in Cleveland, Ohio, Uses an Electric Lift Truck to Good Advantage in Handling Goods of All Kinds.

this work, is scarcer now than ever before, demands much higher wages than formerly and is hard to keep.

Another advantage which the electric truck or tractor offers is due to the frequent occurrence of peak periods in such work. Such peaks usually occur at certain times of the day or on certain days

The Electric Tractor Can be Used to Advantage in Unloading from Cars Into the Warehouse.

with the arrival of boats, trains or a number of street trucks. During these periods the material must be handled with all possible speed in order to free the boat, cars or trucks and relieve congestion. At such times if the trucking is done by hand an extra large number of men are required. During the intervals between these periods, however, very little work is done which means a considerable loss of time. On the other hand if electric trucking apparatus is used, the work during the peak period is greatly facilitated, the congestion relieved and the time lost during the off-peak hours is greatly reduced.

Difficulties Encountered in Application.

In spite of these apparently promising and simple conditions the problem of applying electric industrial trucks and tractors to warehouse work is a difficult one and requires a great deal of care and thought before it can be successfully accomplished.

Perhaps the most common difficulty encountered arises from the design and construction of many warehouse buildings. Such buildings are usually located on either railroad or water frontages or in some similar place where the facilities for outside transportation are favorable. As such property is valuable the desired floor space is secured by constructing buildings many stories in height rather than to spread them out over a large territory and only a few stories high. In addition, such construction, before the introduction of electric industrial trucking apparatus offered one of the best means of increasing handling efficiency, for it decreased the hauling distance and permitted the use of elevators to advantage. This building construction problem is increased by the fire prevention ruling that requires fire walls to be erected segregating such buildings into small areas.

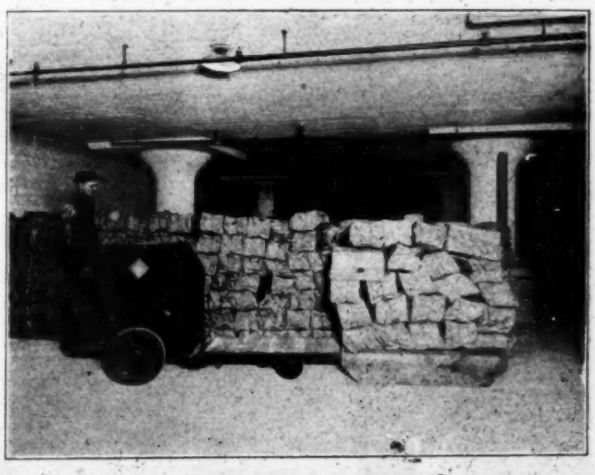
The size and type of goods handled and the methods of distributing are also important factors to be considered. Where the goods are received or shipped in lots stored in one place and are of approximately the same size or type this is a comparatively simple matter. But where the goods are handled in lots consisting of a varied assortment of all sizes and stored in various parts of the building the problem is a very complicated one.

In order to more clearly analyze the handling problem in warehouses it is divided in this article into four operations: Unloading or receiving from an outside carrier into the warehouse; distribution within the warehouse; picking and taking from storage to the shipping room; delivering or shipping from the warehouse to another carrier. In practice these operations often overlap each other to a considerable extent, for example, where the goods are taken directly from a receiving carrier to the storage place, and in addition, the problems which they present are common in many respects. In this analysis the operations in a distributing warehouse are particularly considered, that is a warehouse that receives the goods in large shipments and distributes in the same or smaller ones composed of miscellaneous items. In some warehouses this operation is reversed and for these the order and the subjects must also be reversed.

Use of Electric Industrial Apparatus in Receiving.

Receiving and unloading incoming goods offers perhaps the greatest opportunity for the application of electric apparatus. Shipments are usually received in large quantities from cars or boats and are stored in one certain part of the building. These cars or boats cannot be spotted or placed in the most advantageous unloading positions on account of their size which of course complicates the handling problem. In addition it is essential that they be unloaded as quickly as possible in order to free them for further use. As the material must be hauled over a certain level distance the greater speed and capacity of the electric are very desirable.

The value of the electric in this operation is not generally appreciated, however, due to the fact that with manual labor the goods in unloading are only taken a short distance from the unloading point which of course results in congestion that apparently prohibits the use of the electric to advantage. As a matter of fact with the electric, the material could be taken directly to the elevator or storage space at once or at least far enough removed from the platform to relieve the congestion and permit their operation.



The Electric Lift Truck Can Also Be Used in Distributing Within the Warehouse if the Material Can Be Loaded on Skids.

Where this operation is conducted independently

of the other handling operations the electrical industrial tractor is perhaps better suited than any other type. In using the tractor, suitable trailers can be loaded directly from the car or in the ship and picked up and hauled away in trains to their desired location by the tractor. This of course greatly facilitates the operation and permits a more efficient application of the electric apparatus for no time is lost in loading or unloading it and several trailers can be hauled at once.

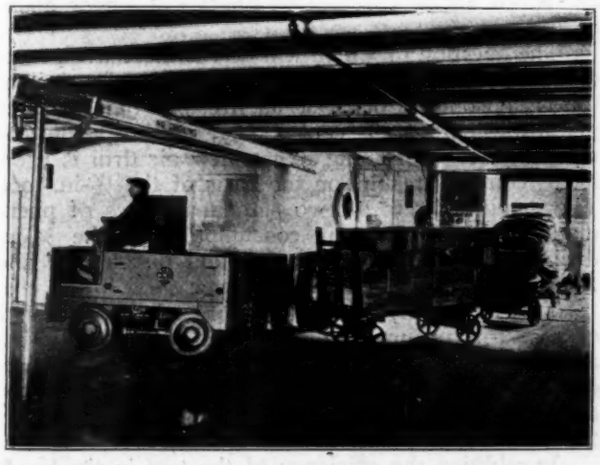
Where the unloading is combined with the other handling and the electric lift truck or some other type is found more suitable for this second operation it is usually desirable to use the other type in unloading also.

Distribution Within the Warehouse and Picking Orders.

In those warehouses that cover a large ground area and are only a few stories high the problem of applying electric apparatus to distribution within the building is a simple one. If the goods handled are mostly of uniform size so that they can be loaded on low skids to be picked up by an electric lift truck and taken to their storage space and left on the skids to facilitate removal this type of apparatus is preferable. It is also well to provide such skids with small wheels or casters so that they can be easily moved short distances by hand. If, however, the material handled consists of a varied assortment of goods of all sizes and weights an electric tractor with trailers will afford the best method of handling. In some places the electric utility truck or one equipped with a gantry crane attachment will be most desirable.

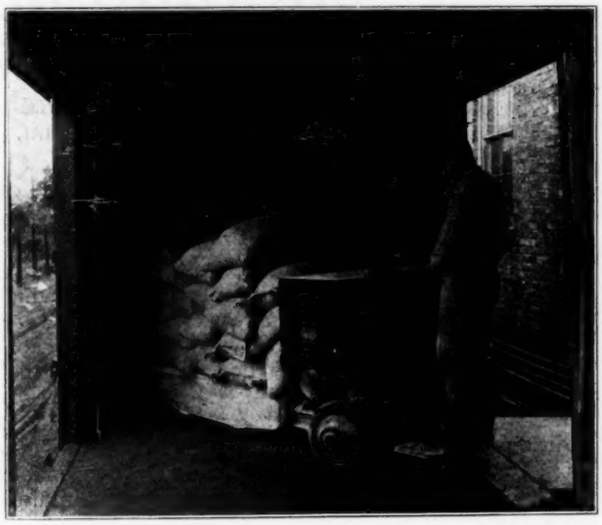
In the taller warehouses where numerous elevators or lifts are used the problem is a much more difficult one. Electric tractors cannot be used to advantage above the unloading floor as the elevators are seldom large enough or have sufficient capacity to accommodate both the tractor and a trailer at the same time. Furthermore elevators are usually located so that the distance over which the goods must be hauled on each floor is very short.

If the material is such that it can be handled by a lift truck however, this type of machine can be easily applied to distributing. As the machine itself occupies but little more space than the load it can easily be carried with the load on an elevator or the load can be quickly placed on the elevator and taken off on another floor by another lift truck. Moreover, they can be easily operated in the dead end passages or aisles such as are encountered in storage buildings.



The Electric Industrial Tractor in Use on the San Francisco Waterfront.

Picking or filling orders in distributing warehouses requires a large amount of trucking and offers a good field for the application of electric apparatus. Orders are usually composed of a number of different items located in various parts of the warehouse which must be collected, assembled, marked, or packed for shipment. All this, with the exception of the packing, is usually done by one man or several men as a crew, unless the number of commodities handled is very great. In such cases sections or departments are formed and the work in each department is done separately.



In Close Quarters Such as This, the Lift Truck Offers Many Advantages.

In one large warehouse where the commodity handled is nearly all packed in bags electric lift trucks are used in this work and each truck replaces the work of six men. In this warehouse a crew consisting of two men with a lift truck collects the order, marks it and takes the completed order to the shipping room where it is left on the skids until called for. The truck then picks up the skid with its load and delivers it to the gravity conveyor from which it is loaded. The bags weigh about 100 lb. each and as many as 40 are carried at one time.

The 9th Street Terminal Warehouse in Cleveland, Ohio, which handles a much larger variety of merchandise composed of barrels, boxes and packages of all sizes and weights also uses the electric lift truck to considerable advantage not only in order filling but in loading and unloading as well.

Under certain conditions the electric tractor can also be applied to this operation but its success will depend largely upon the type of warehouse and the material handled. It is especially adapted to places where the orders received and the quantity of the different items are too large to be carried on skids.

Delivering Merchandise from the Warehouse.

In delivering or loading goods from the warehouse the problem is similar in many ways to that of receiving into the building. The opportunities for the application of electric industrial apparatus for this work in distributing warehouses, however, are not as great as they are in receiving, due to the fact that the orders are usually loaded onto street vehicles which can be placed in the most advantageous position

to receive them. Nor are the peak periods as frequent or marked as occur in receiving for the goods can be placed in position for delivery beforehand and the arrival of the trucks can be more easily regulated. Very often however these conditions are reversed and the problem of delivery becomes a much more difficult one than that of receiving and the application of electric apparatus is more desirable in the former than in the latter.

Special Advantages of Electric Industrial Apparatus in Warehouses.

For practically every branch of warehouse work the electric industrial truck or tractor offers special advantages in addition to the regular handling work, that adds greatly to its value. In cold storage warehouses, for example, the greater speed with which the commodities can be transferred from the warehouse to a refrigerator car are particularly desirable. Many of the items handled spoil if allowed to melt in the open air and any unnecessary exposure to normal temperatures must of course be avoided. In addition the goods can be taken in or out of the refrigerating room much more quickly which enables the temperatures of these rooms to be maintained more easily.

The general utility features of the electric are aiso a decided advantage in warehouses. These places are seldom equipped with power devices for handling exceptionally heavy work. The performance of such work by hand labor not only tires the men quickly but makes them dissatisfied with their jobs and they often quit rather than continue to do it. By using the electric apparatus to assist in this work it can often be accomplished very easily.

The value of the electric tractor for such work was illustrated in a large department store warehouse recently. At that time a large shipment, about 40 carloads, of burlap was received, packed in bales weighing about 2000 lbs. each. Each car was loaded to capacity, there being only about 6-in. headroom between the top of the bales and the roof of the car. The men absolutely refused to unload the shipment even though an extra wage was offered for the work. By using a block and tackle and attaching the cable end to an electric tractor used in the building the cars were unloaded without any extra effort on the part of the workmen and in a much shorter time than would be required if the car had contained lighter material and hand labor used.

Spotting freight cars is another duty which adds to the advantage of electric apparatus for warehouse work. Very few warehouses maintain switch engines for their own work and when a car is to be moved, even although the distance is only a few feet, they are forced to wait until an engine comes from the railroad or accomplish the moving by slow tiresome manual effort. If an electric tractor is used the car can be easily moved by attaching it to the tractor with a cable of sufficient strength.

ADVANTAGES OF ELECTRICITY FOR OPERATING PORTABLE DRILLS SHOWN.

A Comparison of Costs and Efficiencies Between Electric Power and Compressed Air for This Work.

During the past few years remarkable developments have been made in the design and construction of electrically operated portable drills which permits their application for all sorts of drilling work. The greater efficiency and lower operating costs of this apparatus over compressed air drills are not generally realized and for this reason a comparison of these methods has been made by the engineering department of the Van Dorn Electric Tool Co., Cleveland, Ohio. This comparison is of interest to the production manager and factory superintendent in deciding either of two questions: Will it pay to replace air equipment with electric equipment, or will new installations be pneumatic or electric? The three factors to be considered are: Source of power, distribution, and performance. Cost is a function of all three of these factors.

Usually electric power is available, either central-station service or from a private plant. In such cases the source of power item can be dismissed. Where electric power is not available, the choice is between generating it or compressing air. It requires about 22 b.-hp. to deliver 100 cu. ft. of free air per min. at 90 lbs. pressure. This same 22 b.-hp. will deliver 14 kw. driving a generator with 85% efficiency.

The question of distribution must then be considered. The distribution of electric power is flexible, permanent, efficient and much cheaper. The maximum allowance that need be made for loss is 10%. Assuming a 14-kw. source, there will be therefore 12.6 kw. at the tools.

An air line is costly to install, inflexible, subject to freezing, leaks and generally high cost of upkeep. Furthermore, the allowable loss of pressure by friction is 10%, offsetting the electrical distribution loss. It is impossible to prevent leakage, even with constant replacements of hose and repair of joints, and the cost of this item may be tremendous. To illustrate, the amount of leak for very small holes in a 90-lb. system will be:

Size hole.	Amount of leak in cu. ft. per min.
1/16 in.	6.0
1/32 in.	1.5

The leakage, however, is a very uncertain item that may reach almost any figure if the system is not carefully maintained and it is safe to assume that this loss is also 10%. There will be therefore about 90 cu. ft. of air at the tool to operate it under about 80 lbs. pressure.

The question of which will do the most work must then be considered. The efficiency of an electric motor is constant throughout its life, but the efficiency of an air motor falls continuously as the piston and valves wear. Assuming that a new air drill is used, let us compare results on the basis of the ½-in. tool. The manufacturers of two standard makes of pneumatic tools give the air consumption of the ½-in. drill as 15 cu. ft. for the 4-cylinder piston type and 20 cu. ft. for the rotary piston type.

This air supply would therefore take care of five or six ½-in. pneumatic drills. It is safe to state that a ½-in. electric drill with 550 watts input will outdrill the air tool and at this consumption the 12.6-kw. available electric power supply will operate 23 electric drills.

In addition the efficiency of the tool in the hands of the operator is affected by weight, balance and vibration. The advantage of weight obtained in some sizes of air tools is more than offset by the better balance and lack of vibration in the electric tool which enables the operator to handle it much more comfortably and efficiently.

The Newer Aspects of Advertising by Central Stations

A Review and Analysis of the Policies of Leading Utilities with Concrete Recommendations for Improved Practice

By L. D. GIBBS

Superintendent Advertising Dept., Boston Edison Co.

[This interesting comment, which was submitted by Mr. Gibbs, formed the basis of a paper which he presented before the recent convention of central-station salesmanagers at the recent convention of central-station sales managers at a discussion on the Economics of Advertising, by R. S. Hale, also of the Boston Edison Co., which will be presented in a later issue.]

CENTRAL-STATION advertising men in common with advertising men in all other fields were confronted when we went into the war by the problem, "what can we do?" The advertising profession was conspicuously one that had to develop its mission and its field of work. As one man it rose to the occasion. Never before has advertising exerted so great a force for good; never before has it had so wonderful an opportunity in every one of the broad fields of endeavor. Wherever our government discovered a need to be met or a gap to be filled advertising rose to the situation. Our millions of people were "sold" to an ideal, and for that ideal they gave their money, their clothes, their food and their lives. Thus was proved, so every man could see, what advertising can do.

Now, therefore, is our time and opportunity. Our controlling business men have a higher appreciation of the value of advertising service than they ever had before, an appreciation which they never would have gotten—in the central-station business at least—from anything we could have said or done in the ordinary way. It is not too much to assume that they are waiting now for us to make good in our business field as we all made good in the patriotic field. They are not, however, going to hand us advertising appropriations for the indiscriminate exploiting of ideals. They have got to be "shown."

How Representative Central Stations Consider Advertising.

A study of a questionnaire received from a number of central-station sales managers shows:

(1.) That the annual expenditures for all forms of advertising have been modest.

(2.) That, although most of the companies report definite budgets, their advertising expenses have really been, for the most part, contingent upon what the managements felt were the exigencies of the situation, and the expenditures have, for the most part, become "budgets" only after they were placed upon the ledgers at the close of the year in which they were made.

(3.) That consistent campaigns based on appropriations have been running only comparatively a few years out of the relatively long existence of most of the corporations as public service companies. The notable exceptions are the large companies. It has been interesting to note in looking over this review of advertising that usually the starting of advertising campaigns has been coincident with some climax in antagonism on the part of the public, or the discovery of some near-critical state of the central-station's finances.

(4.) The distribution of the advertising charges upon the accounts of the departments most obviously interested appears to be general. One company of the 12 reporting makes its advertising expenditures stand by themselves—apparently, a general operating expense; another, divides these expenses between new business and a "publicity" account. These methods of charging are perhaps as indicative as any of the appreciation of advertising.

It shows that in those companies they have reached the point of admitting advertising to the ranks of the constructive activities of their companies. Most of us have not yet gotten away from the notion that somehow or other anything spent for advertising must be charged into the cost of getting new customers or selling appliances.

(5.) Six of the 12 companies have advertising departments, and 6 conduct the advertising under the direct supervision of the sales departments. Of the 3 companies that had not reported when this was written 2 have advertising departments. This indicates a growing appreciation of the importance of putting the advertising work on its own basis. It is the only proper way; although, of course, any advertising department is expected to work in complete harmony with every other branch of the business.

(6.) Only 2 companies of the 12 have conference or advisory committees, which discuss sales and appliance campaigns well in advance of the time when they will become active, and pass, in a general way, upon the advertising copy.

(7.) Only in a few instances is it reported that campaigns along special lines have been conducted for any extended period. This shows a failure to get the most out of advertising expenditures.

(8.) Eight out of 12 have used street-car card advertising; 5 have used illuminated billboards; 3 have used advertising on the backs of their monthly bills; 2 use stickers attached to their bills; 1 makes enclosures with bills; all have used so-called "follow-up or direct-by-mail" advertising; and all have used newspaper advertising. Only 2 report the use of "house organs" at the present time, but probably most of the companies have at one time or another used this medium.

(9.) Only 2 report that their advertising programs are laid out a year in advance; 1 reports that an effort is made to conform to this plan, and the others, for the most part, report no policy. Copy is apparently prepared by practically all of the companies just previous to its use.

(10.) None of the companies attempt to check advertising results except on "follow-up."

(11.) Five of the 12 use advertising agencies to handle their newspaper advertising; only 1 reports employment of an advisor, and with 4 of the 5 companies the agencies do their work for the commissions they receive from the newspapers.

(12.) Four companies would use any possible extra appropriation entirely in advertising; 4 would divide the appropriation as needed; 1 would divide the appropriation ⅓ for increasing the sales force and ⅔ for extra advertising; another would give ⅔ to increase the sales force and ⅓ to extra advertising; 1 would use the appropriation for increasing the sales force.

The answers to Question 12 are so significant of the appreciation of the value of advertising as to warrant their reproduction here.

The question was: "If you could have an extra appropriation to spend in new business development, how would you prefer to spend it—in increasing your sales force or in advertising?"

Views on How to Spend Appropriation.

The replies are as follows:

A. As far as the new-business work is concerned both solicitation and advertising are important, and one is vital to the other. Industrial work requires considerable more personal solicitation and engineering work, but should be followed continuously by advertising, both newspaper and direct mail. For residential new business, a great amount of advertising followed by personal solicitation is required; such solicitation should be divided into districts and prospects thoroughly canvassed. Both advertising and solicitation will have to be increased to obtain the business that the central stations deserve, and this work must be continuous and persistent to get results.

B. I would increase advertising and sales force. Advertising is absolutely necessary to the success of the selling force. We have found that the most experienced salesman cannot go into a cold field and get as much business as an inexperienced salesman in a field that has been warmed up with advertising.

C. Two-thirds in advertising and one-third in increasing the sales force—under present conditions.

D. It would depend upon the branch of the new-business work to be developed and whether or not we had a full complement of sales people.

If it were power business to be developed and we did not have a complete sales force we should prefer to spend the money for salesmen. If we did have a complete power sales force we would spend the money for advertising.

If it were lighting or appliance business to be developed and we had a complete sales force we should prefer to spend the money for advertising. Even if we did not have a complete sales force it is likely we would spend the money for advertising and put on an additional sales force on a straight commission basis.

E. An extra appropriation to be spent for new business would undoubtedly be entirely spent for advertising rather than for an increase in sales force.

F. At the present time in more men.

G. 60% sales force—40% advertising.

H. In advertising.

I. Just at present, owing to a very radical reduction which was made in our sales organization at the beginning of the war, we need additional sales force. We are also planning some special advertising booklets—the first one being a booklet on Electrical Heat Applications for Commercial Purposes such as electric furnace for melting, heat treating, enameling, japanning, baking, etc. Material is now being prepared to get out this booklet the cost of this having been included in our annual budget made up nearly a year ago.

Our reply to this question, therefore, is that additional expenditure in the sales department would be for both salesmen and advertising.

J. I would say that under our conditions I would much prefer increasing our sales force rather than advertising, but if we were seeking to build up a residence business (which is not necessary here, as the residence business is so developed), I should certainly spend money on advertising.

K. Both. Advertising to disseminate the word broad-cast and stimulate—Additional salesmen to make the actual sales.

These answers clearly show an appropriation of the value of advertising for special drives such as any extra appropriation would probably be used for, and that appreciation must be predicated upon results secured from regular advertising.

Further development of central-station advertising can only come with a clearer understanding of what we want to gain so that the campaigns can be effectively directed.

How to Sell the Advertising Idea.

If we are to sell the advertising idea we must show that we are able to adapt the idea to the needs of our companies. We must learn first where the advertising can be applied, prove that we can get the results when and where they should be secured, and develop our work in its scientific application.

There is no reason why we cannot do this. We have struggled with it, sometimes we have produced results that could be shown, but too often the outcome has been intangible.

Down deep in their hearts, the executives of central stations, the boards of directors and the leading stockholders believe in the power of advertising. When a big emergency arises, where the public must be informed quickly, they turn without a moment's hesitation to publicity and it is spread with a lavish hand. The campaigns are at once big with influence and ring with the truth of conviction. When the emergency passes the inclination to stop expense very naturally comes to the front.

Continuous publicity explaining the growth, stability, kinds of service, reductions in rates, comparisons of costs of electric service with other kinds, business policies, etc., should be kept up. Executives are not yet ready to adopt this policy; deterred possibly by memories of the costs of special campaigns along these lines, and fearful that the cost of continuous campaigns would be proportionately greater.

There is no reason why this kind of publicity should be charged against the operating expenses of a sales department, and usually a sales manager joins with his superiors in opposing such campaigns if he must pay for them. We can, however, push the advertising for building up business in certain localities, and promoting sales of appliances, in the hope that the favorable impressions resulting from successful work along these lines will reflect favorably upon the larger ideals.

Advertising Should Be Laid Out in Conference.

The conference method of laying out advertising campaigns for at least a year in advance will be the

quickest way to accomplish results. This is the common sense method; it takes our advertising out of the class of intangibles, forces the advertising man to argue his case and defend his suggestions; brings new ideas to the minds of other officials around the conference table, and in general, tends to clarify the whole situation. Men cannot regularly get together in conference and not come to appreciate one another's view-point. It is perfectly possible to plan our advertising policies a long ways ahead, certainly as far ahead as one year.

Continuous Advertising Pays Best.

The absence of any advertising campaigns extending continuously over a period of years further discloses our haphazard methods. We appear to be all the time dealing in special campaigns, special sales and drives, when a moment's reference to the returns resulting from a continuous campaign on one line running for two or three years shows what could be accomplished if we focused attention on a particular line of sales effort year in and year out. Nearly every central station nowadays follows consistently the new building field, getting on the job before the foundations are laid even for small dwellings. A number of companies have followed well-defined policies in securing the wiring of old houses. Isolated plants are vanishing before consistent and persistent attacks. But these policies must become general so that the results will be definite and tangible from every point of investigation, if we expect to really prove up on advertising.

The kinds of advertising and the mediums used must be proved up. It is a strange mixture that shows central stations using the newspapers, miscellaneous follow-up schemes, street-car-card advertising, iliuminated billboard advertising, stickers on bills, enclosures with bills, and house organs in most cases for only short periods at a time—not long enough to get real results. Where are the data to show the value of these mediums? Why do we jump from one thing to another? We seem to have settled on the newspapers as a regular medium, but not one of the central stations represented in this convention makes any attempt to check the results.

How Good Will of Newspapers Is Acquired.

An erroneous belief still seems to exist that a few columns of paid advertising will influence a newspaper to treat us kindly, which some people still think means leaving us alone. Long experience in the newspaper business, and a wide acquaintance with newspaper publishers, editors and reporters has proved to me that the paper that has a tangible influence will not be swerved by a little advertising. What really does happen is that as a result of the personal acquaintanceships developed in the course of business, central-station men and newspaper men are brought together. Each side finds the other human. The newspaper men find there is no mystery about the central-station business, and mutual understanding promotes good fellowship—the really satisfactory basis of all business relations. But let us try some of the other mediums more continuously and efficiently; give attention to the checking of results; practice some "follow-up" on ourselves.

Central stations seem in their appliance business to be always bargaining, dickering, restlessly shifting from one thing to another, campaigns on this article; campaigns on that article; and when a manufacturer comes along with something new, or some new model of something old, we jump to start a special sale on it. Business houses use special sales for cleaning-up time, they put their goods on the shelves and handle them on a regular merchandising plan. If for any reason the stock fails to move, then it is dumped through special sales. I wonder if the public does not get the impression that the central stations are all the time dumping something.

Arriving at a Fair Appropriation.

Department stores of recognized standing and reputation do not plan to spend more than 2% of their gross receipts in any one year in advertising. Businesses that are building up must spend as high as 5%. Some lines in which the merchandiser depends on so-called class and distinction spend 7%. In other lines where special appeal is made to style and exclusiveness retailers spend as little as 1%, but the manufacturers from whom they buy spend in national advertising what would be equivalent to 2 or 3% more for the local dealer in his field. The dealers in electrical appliances are in the class of the retailers, whose merchandise has class and distinction, and have extensive co-operation through the national advertising of the manufacturers. We have thus far exerted too little effort to co-operate. Too frequently we fail to realize that the manufacturer is giving us a service of inestimable value. We forget that the manufacturers are making not only their appliances but electric service household words.

If central stations will intelligently apply only 1% of their annual gross receipts to advertising they can take advantage of every form of co-operative help to the fullest extent, and put themselves in the strongest possible position.

NEW GERMAN LOW-POWER LAMP DEVELOPED.

The British Government Review of the Foreign Press (Technical Supplement) contains particulars of a new German low-power lamp which was described in the *Electrotechnische Zeitschrift* for April 24. The lamp depends on the discharge of electricity in an atmosphere of neon. The lamp is made for 220-volt circuits, and has a consumption of 1 to 5 watts. It is suitable for use as a signal lamp, or in places where inflammable gases are met with, as it is immediately extinguished if the bulb is damaged. They may be used as polarity testers, insulation testers, and rectifiers. The glass bulb contains a mixture of neon and helium at a pressure of 8 to 10 mm. The cathode is of large area and hemispherical shape, and the anode, in the form of a wire, reaches to such a small distance from the edge of the cathode that a brush discharge starts, without external aid, at 220 volts. The voltage of the lamp sinks, when the discharge begins, to about 190 volts, and the remaining 30 volts are absorbed in an external resistance. The cathode may be made of various metals, but iron is preferred, owing to its easy production in the form of thin sheet, its small capacity for absorbing gas, and slight tendency to volatilize. The orange color of the neon light is corrected by mercury vapor, and a pinkish-white color is thus obtained. With direct current the lamp must be connected with correct polarity to the mains, and with alternating current the anode should not be too small in area and thickness relatively to the cathode. A 210-volt lamp with iron electrodes gives 0.44 Heffner candlepower at 19.2 milliamperes, with 186 volts across the lamp terminals, thus taking 4.03 watts from the line, and 9.2 watts per Heffner candlepower.

Central-Station Rates in Theory and Practice

Eighth Article—General Discussion of the Price of Service —Three Principles on Which Price or Rate Systems May Be Based—Cost, Maximum Earnings and Value of Service

By H. E. EISENMENGER

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This is the eighth article of this series, which began in the issue of July 12 following a general preliminary outline of the entire series in the July 5 issue. The first seven articles have considered the cost of electric service, a knowledge of which is necessary before any system of rates can be determined on, because the income of any central station must in any case exceed the costs of rendering its service. In the present article is begun the discussion of the principles governing the selection of a rate system, more particularly the general policies underlying the questions of what amount of profit shall be desired and in what proportion shall the different classes of customers contribute to that profit. These articles will be continued throughout practically the entire volume.

PART II—THE PRICE OF ELECTRIC SERVICE.

1. General Remarks About the Three Principles of Establishing the Profit Over Cost.

SECTION 62. The price is cost plus profit; in other words, the price is made by adding a certain percentage of profit to the cost. This percentage may be constant for all units of the commodity[1] and consequently for all customers so that the prices or charges to every customer are proportional to the cost. Or the percentage of profit may be varied between the different units of the commodity sold, in an endeavor to make the customers pay a larger percentage of profit for those units which they value more highly and for which they are therefore willing and able to pay higher prices than for those units which have a smaller monetary equivalent and which possibly would not be bought at all at higher prices. In this case we will charge to different customers prices involving different profits for the same service[2] and, on the other hand, we will charge the same customer prices involving different profits for different kinds of service. For instance, we may charge him a different percentage of profit for heating current and for lighting current.

63. These two differentiations—kind of service and customer—go together and intermingle. If, therefore, in the following theoretical discussions sometimes, for the sake of brevity, only the differentiation between customers is mentioned, it must be understood that this always includes differentiation between classes or kinds of service, unless a remark is made to the contrary.

64. The first one of the two principles mentioned above (that of collecting the same percentage of profit from all customers) is called the *"cost-of-service principle,"* because the price is based on the average cost of the service (see Section 3). The second method of price calculation may be embodied either in the principle which is effectively designated as *"charging what the traffic will bear"* ("maximum-earnings principle") or in the so-called *"value-of-service principle."*

65. The term "What the traffic will bear" means: Collect from every customer and for every kind of the service prices as high as the customer is willing and able to pay[3], and not lower, but refuse to sell service in all cases where the prices sought are so low that they do not cover the cost (more exactly speaking, that they reduce the earnings, see Section 72), so that the earnings of the vendor reach a maximum; in other words, extort from the public as much profit as you possibly can.

The lengthy term "what-the-traffic-will-bear principle" will in the following be replaced mostly by the shorter term, "maximum-earnings principle."

66. The "value-of-service principle" differs from this inasmuch as its aim is not primarily a maximum of profit to the vendor, but it attempts to bring the greatest good—in the form of good and price-worthy service—to the public and to let the greatest number of people partake of the benefit of the respective service. The value-of-service principle charges higher prices for those kinds or classes of the service for which the respective customers are willing and able to pay such prices without reducing their consumption, but it differs from the "what-the-traffic-will-bear" policy inasmuch as it uses the excess income from these higher prices to reduce the prices to those who would otherwise use less service or who would not be customers at all, for instance, to the poorer people.

Under the "maximum-earnings" principle (see Section 65) the earnings can never be high enough. Under the "value-of-service" principle, if the earnings become abnormally high, lower rates are offered. either mainly to the profitable customers, or to the unprofitable ones who heretofore had not been served. or to both groups. We can thus either (a) give to the profitable customers the advantage of lower rates,

[1]This means in case of electric service it is constant for all kilowatt-hours where an energy charge is made and constant for all kilowatts wherever a demand charge is made and also constant for every customer as far as a customer charge is concerned.

[2]Restricting ourselves, from here on, for the sake of convenience of expression to such commodities as are services, although th same deductions apply to all commodities.

[3]Each consumer has, consciously or unconsciously, established certain limiting prices which he is willing to pay for the various parts of the service, even though the line beyond which he is not willing to buy the service may be a more or less hazy one. If he is charged more than this limit for any part of the service, he will forego the use of that part and restrict himself to the remaining parts of the service until, with increasing prices, he will finally drop out as a customer entirely. Thus with an increase of electric lighting rates a customer will refrain from burning certain lamps at certain hours.

or (b) extend the benefits of the service to new customers, or (c) we can combine the two advantages, each one in a lesser degree than under (a) and (b), respectively; that is, we grant a lesser degree of the rate reduction to the profitable customers and extend at the same time the service in a lesser degree to new customers (see Sections 88-93 in a later installment).

The value-of-service principle "discriminates," so to speak, between customers by charging different percentages of profit from them, whereas the cost-of-service principle "discriminates" between customers by charging different percentages of the prices which their valuation of the service would prompt them to pay. The discrimination of the value-of-service principle is of the same order as the discrimination of an income-tax system which does not collect the same sum of money from everybody objectively, but endeavors to make each one bear the same financial burden, measured subjectively at what money is worth to the respective person.

67. With the possible exception of such cases where the valuation of the respective parts of the service is determined by the price of a competitive service of equal quality, we can never hope to have more than a roughly approximated and hazy knowledge of that valuation. Nevertheless, the discussions hereafter of a few theoretical questions in this connection may be of interest and usefulness, although they start from the assumption that the valuations by the customers of the various parts of the service are exactly known in dollars and cents.

In the same manner the theory of structural strength of materials is useful as giving us an exact insight into the conditions, although in practical application to engineering structures invisible and unknown irregularities or defects in the interior of the material and other factors introduce such an element of uncertainty and haziness into the calculations that we have to choose a large factor of safety in practice and cannot go far towards exact application of our theory. Likewise in figuring the voltage drop in transmission and distribution lines we possess very elaborate theories but if we apply them in practice we find that the basis of the computation, the load to be expected, is generally known only very approximately, mostly even only from guesswork. Yet nobody will deny that these theories are useful, because they show us in what way various factors influence the result.

II. The Principle of Charging What the Traffic Will Bear (Maximum-Earnings Principle).

68. The principle of charging what the traffic will bear ("maximum-earnings principle") takes care of the interests of the producer only, in an entirely one-sided way, to the detriment of the other party concerned; that is, of the consumer who, especially in the case of public service corporations, represents the general public. This principle is therefore unethical and its further examination might be dispensed with if it were not for the fact that the "value-of-service principle" is a development of the maximum-earnings principle with certain corrections to take care of the consumer's interests and, as it is thus based on the maximum-earnings principle, we will have to investigate the latter as an introduction to the study of the value-of-service principle.

69. The sum of the total charges collected from all the customers is the *gross revenue* or *gross income*. Deducting the cost of production from the gross revenue, we get the *net revenue* or *net income*.

In the case where the capital is to bear a fixed percentage of interest (bonds, see Section 2) we will require from the point of view represented by the "what-the-traffic-will-bear" principle that the *net income* becomes a *maximum*. If, however, the percentage of return on the capital is variable (stock dividend), we are not interested in a maximum of the net income, but *in a maximum of return* on the capital.[4]

70. The maximum "earnings" to which the "what-the-traffic-will-bear" principle aspires may therefore either be a maximum net income or a maximum rate of net return (dividend). The term "earnings" will hereafter be used to embrace the meanings of both "net income" and "rate of return" and for the sake of generality the meaning "gross income" will be included also.

71. The requirements of a maximum net income and of a maximum return are not fulfilled by the same conditions. A change of prices may, for instance, increase the net income, but it may at the same time increase the necessary capital in a greater measure[5] so that the rate of return is reduced. (Compare Section 4 of Insert IX.)

72. If we want the earnings to become a maximum, we must arrange the rates according to the following two principles: (1) We must attempt to charge for every unit of the commodity just the maximum limit at which it can still be sold under the circumstances and not less, and (2) we must refuse to sell

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[4]The last sentence is in general subject to a certain correction: If the enterprise is prosperous, it will for the following reason be of advantage to grant a reduction of prices within certain limits, even though this will be connected with a reduction of the rate of return. The reduction of prices will result in an increase of the demand for the commodity, a larger amount of the commodity will have to be produced and this requires an increase of the capital invested. If the price reduction remains within certain limits it must of necessity result in an increase of the net income (as proved in Section 4 of Insert IX). If now the additional ("increment") net income is large enough in comparison to the additional ("increment") capital, the additional investment will be profitable in itself without any reference to original investment. If we have, for instance, prices which produce 50% net return on a capital of one million and if a reduction of prices will reduce the net return to 40% but at the same time make the investment of another half million necessary for increasing the producing facilities (in case of a central station), we will prefer 40% of 1½ million to 50% of one million, the more so, if the money can be raised by bonds. The additional half million will bear $\frac{0.40 \times 1{,}500{,}000 - 0.50 \times 1{,}000{,}000}{500{,}000} = 20\%$, which is so handsome and attractive a net rate of return that we would not hesitate to reduce the price still further in order to obtain the opportunity for the investment of further capital at a lower percentage than 20%. The rate of return on the additional capital decreases with every price reduction and we will continue the price reduction until the return on the increment capital ceases to be attractive.

By induction from this example we can say: The most desirable price from the point of view of the producer (central station) is found if, starting from the price which furnishes a maximum rate of return, we lower the price so long—and not longer—until a further very small price reduction will furnish an increment income barely large enough to yield a rate of return on the increment capital, which is just at the limit of being attractive to new capital. The total (or "average") net return on the capital is then smaller than the maximum possible net return but larger than the rate of return which is still just attractive to new capital. Likewise, it can be easily seen that the most desirable price is lower than the price which furnishes a maximum rate of return but higher than the price which furnishes a net return barely at the limit of being attractive to new capital. At the same time this price can, of course, never reach down as low as to the price p_n (which furnishes a maximum of the net income n) because the increment net income at that price is zero and therefore the (gross) rate of return on the increment capital will also be zero which after deduction of depreciation and other fixed capital charges would make the net return (dividend) on the increment capital not only not attractive but even negative. (Compare Section 18.)

Wherever the most desirable price is situated, we are safe in the statement that at least as long as a reduction of the price results in an increase of the net return this reduction is advisable from the producer's standpoint. With this understanding the following investigations will assume that the most desirable price is that which brings about a maximum net return, although it is actually lower and situated between the price which produces a maximum net return and that price which produces a maximum net income.

[5]By increasing the quantity of the commodity which can be sold and which therefore is to be produced.

any unit of the commodity at a price which reduces the earnings.

73. The first one of these two points implies that we have not only to make different charges for the same service to different individual customers—or at least to classes of customers—but also to charge the same customer differently for different kinds of service, for instance, for heating and lighting current. We have even to go further than that; we must charge different units (for instance, different kilowatt-hours) of the same service differently to the same customer, as the following example will make clear. A certain customer may use 100 kw-hr. per month for his lighting if he has to pay an energy charge of 6 cents per kw-hr. If he gets a cheaper price, he will generally use more current for his lighting by increasing his illumination, or his burning hours, or by using indirect lighting methods, etc. The additional kilowatt-hours are worth less to him than the original ones; they have more the character of a luxury, as is plainly demonstrated by the fact that he is not willing to buy them if he has to pay 6 cents, whereas he does buy the first 100 kw-hr. at that price. Let us assume that the number of kilowatt-hours he is willing to purchase per month at various unit prices of the kilowatt-hour with a given constant demand charge is given by curve[6] *m*

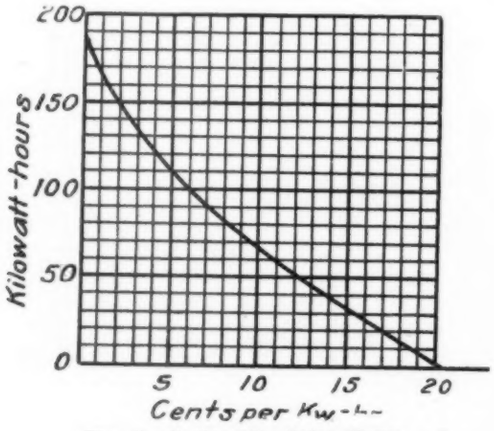


Fig. 2.—Customer's Sales Curve.

in Fig. 2, which shows that at 6 cents per kw-hr. he will use 100 kw-hr. and if the charge is lowered to, let us say, 4 cents per kw-hr., his consumption will rise to 125 kw-hr. If we want to sell that latter amount to him, we need not lower the unit price for the first 100 kw-hr. per month because the customer is willing to pay 6 cents for every one of them, but we must lower the unit price to 4 cents per kw-hr. for each one of the next 25 kw-hr.[7] In pursuance of this same method of reasoning we find from the curve that (choosing unit prices stepped off by whole cents) we ought to charge a price of 3 cents per kw-hr. for the next 13 kw-hr. (i. e., from the 125th to the 138th), etc., until we reach the limit mentioned in the following section (74).

[6]To be called "sales-curve" of the customer, compare Section 1 of Insert IX.

[7]The first 125 kw-hr. cost then a total of 600 + 100 = 700 cents, or an average of 700/125 = 5.6 cents per kw-hr. It might seem on superficial observation that the effect is the same if we charged 5.6 cents per kw-hr. uniformly for every kilowatt-hour throughout, from the first to the 125th. It must not be lost sight of, however, that if we charge uniformly 5.6 cents per kw-hr. the customer will not use 125 kw-hr. but a lower number (somewhere between 100 and 125 kw-hr.); according to the curve he will use only about 105 kw-hr. with a resulting revenue of only 105 × 5.6 = 588 cents instead of 700. On the other hand, if we attempt to make the customer use the whole amount of 125 kw-hr. under a uniform price for every kilowatt-hour he will have to go down as low as 4 cents per kw-hr., which will reduce the income to 500 cents.

Extending the same principle to the other (right) side of the curve we will find that instead of charging 6 cents per kw-hr. for the first 100 kw-hr. we should rather charge the customer 20 cents per kw-hr. for his first 2 kw-hr., 19 cents for each of the next 5 (3rd to 7th), 18 cents for the next 6 (8th to 13th), and so on, until we arrive at a unit charge of 7 cents for all kilowatt-hours from the 81st to the 90th and of 6 cents from the 91st to the 100th kw-hr. To be quite exact, we would have to deal with steps smaller than 1 kw-hr. and smaller than 1 cent; strictly speaking, the steps should be of infinitesimal size.

74. The second one of the two points in paragraph 72, that under the maximum earnings principle we must refuse to sell any unit of the commodity at a price which reduces the earnings, obviously means the following:

(a) If we aim at a maximum *gross income* it is evident that every sale will increase the same. There is no price above zero in existence which reduces the gross income.

(b) If we aim at a maximum *net income* we must avoid any sales of which the gross income does not reach at least the increment cost over the cost of all the commodities already produced before[8], that is, only such sales must be made of which the *increment net income is positive*. If the increment net income is positive, the *rate of return of the increments* must of necessity be positive also, and *vice versa*; we are designating by this term the rate of return which the increment net income provides for the increment capital.

(c) If we aim at a maximum *rate of return* it is not enough that a positive "rate of return of the increments" result from the respective sale, but it must be *greater than the rate of return* produced by all of the other sales which have been made before the addition of the respective sale.

75. We can also express the contents of Section 74 in the following manner: Under the maximum-earnings principle we must refuse to make any sales at prices which are lower than the cost increment per unit[9], the term "cost" being defined in each case as those portions of the expenses (see Section 2) with which the respective kind of "earnings" (gross income, net income and rate of return, respectively) is concerned in the following way: *Gross income* is not concerned with the cost at all, inasmuch as cost does not play any part in the makeup of the gross income and we have to set the cost in this case = 0; as the cost is therefore constant, the cost increment is also = 0 and the lowest price which is permissible under the maximum-earnings system in order to obtain a maximum gross income is zero, that is, any sale, however low the price obtained, will swell the gross income

[8]See Section 3 of the first of this series of articles and the footnote to Section 25 of Insert IX. The increment cost depends not only on the amount of the commodity added but also on the amount of the commodity produced before the addition of the incremental amount of the commodity. The increment cost from 100 to 200 units will generally be greater than the increment cost from 1100 to 1200 and greater than the increment cost from 10,100 to 10,200 units. The same applies to the increment capital.

[9]Note the difference between the meanings of the following three terms: (a) increment of (total) cost or cost increment; (b) increment of unit cost and (c) cost increment per unit.

If, for illustration, it costs $500 to produce the first 100 units of a certain commodity (for instance castings) and $600 to produce the first 150 units, we will get the numerical values for the above three terms for an increase of the production from 100 to 150 units as follows:

(a) The cost increment is $600 — $500 = $100.

(b) The increment of the unit cost = unit cost for a production of 150 units minus the unit cost for a production of 100 units = $600/150 — $500/100 = —$1. The increment of the unit cost is therefore a negative amount and it would in this case be more convenient to use the term "decrement of the unit cost."

(c) The cost increment per unit = $100 / (150—100) = $2.

Net income is affected by the cost of labor, material, etc., as explained in Section 2, but it is entirely independent of the capital charges, such as interest, depreciation, etc., and we will therefore define the term "cost" in this case as excluding the capital expenses. Where we are interested in the *rate of return* (dividend) the term "cost" must be understood to include the capital expenses on the increment capital[10] figured at the same rate of interest which all the other aggregate sales yield on the aggregate capital.

We see that, with exception of the case dealing with a maximum of the gross income (which has no practical importance), the question whether or not a certain sale is desirable under the maximum-earnings principle can be answered only if we take into account the sales already made before the addition of the respective sale, because the increment cost and the increment capital depends on the number of units produced. In case we consider the rate of return, the profitability of the other sales has also an important bearing on the question; for instance, a certain sale netting a rate of return of 15% on the increment capital will be desirable, if the other sales together produce an average return of 10%, but it must be avoided if the rate of return of the other sales averages to 20%.

76. If we consider not one single sale but ask which ones of all the possible sales shall be accepted and which ones refused to get a maximum of earnings, we will first pick out those which produce a maximum gross income per unit because they will produce a greater increment net income and "rate of return of the increments," respectively, than any other sales, regardless of the way in which the increment cost and the increment capital, respectively, are figured. This means we start with the sales which bring higher unit prices than any other ones; then we add gradually sales with lower and lower prices until we arrive at prices which begin to reduce the earnings (either a negative increment net income or a "rate of return of the increments" smaller than the average rate of return resulting from the sales considered heretofore).

77. We see from the foregoing *that the average cost per unit has no influence on the price of a certain unit* under the maximum-earnings principle. The price of a certain unit which is sold profitably may be higher or lower than the average cost. The same applies for the value-of-service principle.

[10]The increment capital to be figured in the same way as the increment cost; see the preceding footnote of this Section.

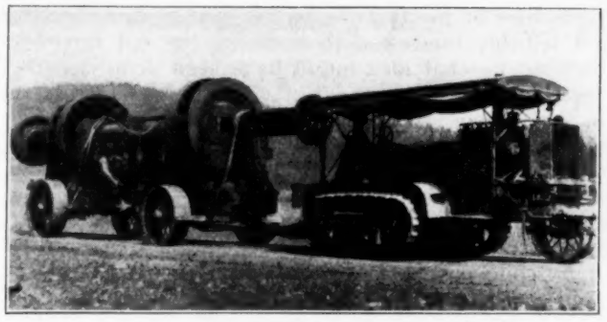
(To be continued.)

HEAVY POWER-PLANT MACHINERY HAULED BY TRACTORS.

Caterpillar Tractor Used to Move Hydroelectric Machinery to Long Lake Water-Power Plant.

An interesting example of the utilization of caterpillar tractors and trucks for hauling heavy machinery this summer was that made by the Washington Water Power Co., Spokane, Wash., in transporting to Long Lake the equipment required for the installation of its new hydroelectric unit in its existing plant. This required a haul of eight miles from the nearest railroad to the plant, over the earth bed of an old railroad grade.

The heaviest load, illustrated herewith, consisted of the turbine runners and shaft which weighed 38½ tons. This was hauled upon a Holt 30-ton wagon, and was drawn by a Holt 45-ton tractor. The axles of



Holt Caterpillar Tractor Pulling 38½-ton Load Consisting of Turbine Runners and Shaft.

the wagon were strengthened so they would support the load. The generator parts in three pieces, similarly transported, weighed 15 to 16 tons each. The lightest load of the trip was 20 tons, for which four three-wheel logging trucks were used. In the latter operations two 10-ton trucks were pulled by one caterpillar. In one of the illustrations there are shown two trucks, one bearing a transformer element and the other a tank, drawn by a tractor.

Incidentally, it may be said, that the penstock of a length of 239 ft. for the new unit at this plant is

Transformer Element and Tank Being Hauled on 10-ton Trucks by a Holt Caterpillar Tractor.

complete, and that the installation of the turbine, generator and other equipment will be completed by Nov. 1, 1919.

PSYCHOLOGY IN CAR FARES CRITICISED.

Apparent Advocacy of Home Rule Criticised by H. S. Cooper, Well Known Consulting Engineer of Texas.

To the Editor:

I have read with much interest the editorial in the August 16 issue of the ELECTRICAL REVIEW and have also read with equal interest the similar views of Secretary Baker, those others of like opinion who have testified their beliefs and experiences before the Federal Electric Railways Commission and the many who are putting similar opinions into print in newspapers, magazines and special publications. "Boiled down to clear syrup," the idea is that all increases in fares should be submitted entirely to local decision, that outside or extraneous authority, such as State Public Utility Commissions, should be debarred from any authority or control in the matter. If such an idea had been offered by one or many who did not have

cognizance of the facts or by those who were directly and selfishly interested in retaining the old fare—or lowering it—that idea might have been dismissed for either of those reasons. But when men of authority in, and supposed knowledge of, local electrical transportation operation give vent to such ideas and when such magazines as the ELECTRICAL REVIEW give them currency and echo them, then it seems time to put in a most urgent protest.

Outside of the fact that the last two years have pretty conclusively proved that not 1% of the municipalities will allow any increase in their street-railway fares if it can possibly be prevented, lies the further fact that in this matter, as in other matters relating to their public utilities, no community is capable of equity and justice in its communal decisions where those who actually make these decisions are directly and financially interested individually in but one phase of the matter—that which will be of advantage to each one without reference to what disadvantage it may cause to others.

Further, consider the case as it stands when those in the community who will be affected by a certain condition on which their decision will be the last and only one, are made the final arbiters. Is it in human nature as at present constituted to take the side which is the equitable and just one and to do so knowing that that decision will bring financial loss or increase of living expense? That is too much to ask of fallible human beings except in such dire emergencies as occurred during the late war—and it would seem from the many "investigations" now being made that even the stress of war times did not rid certain classes of taking advantage of any opportunity to better themselves, no matter how low or selfish the motive.

Outside of the known and acknowledged fact that "home rule" of the local utilities by their communities always means an admixture of politics and demagoguery in the settlement of any question in which the utilities are interested, lies the further present fact that such decisions as are now made in these matters are never made by the responsible element in the community. Before the advent of the automobile, when the street car was the necessity vehicle of every class, any question with reference to it was a common and universal topic of interest among all citizens. At the present time, outside of such laws or ordinances which restrict reckless or careless driving and which are an outcome of street-railway traffic, or outside of parking restrictions on streets which have street-railway tracks on them, the automobile owners and users have only an academic interest in the street railway and little or none in the matter of its fares. Except to oblige a friend, to settle a grudge or to carry out a theory, no automobile owner or user will exert himself to vote or otherwise affect the decision of the community. Those who do so vote, or shout, are either those whose daily expenditure will be measurably increased by an increase of street-car fare, those who have an axe to grind—politically or financially—those infested with municipal ownership or other socialistic isms and ologies and those who are "ag'in all corporations."

Beyond all this is the fact that to allow any community to be the court of last and only resort for its local utilities is to upset all our ideas of equity and justice, and the fact that this has been permitted in the past and is being urged and condoned at the present time does not alter the ethics of the case. What would be thought in equity and law of any trial in which one party was plaintiff, prosecuting attorney, jury and judge all rolled into one and all having a selfish personal and individual interest in but one verdict and sentence? And yet that is exactly the case in "municipal home rule" when it is calmly and dispassionately analyzed. Here is a portion of the community—the portion which always votes in matters which indirectly or directly affect it in any individually selfish manner—permitted, nay, even urged, by those who should know better, to make a decision, a final decision, a just and equitable decision, on a matter which touches their pocketbooks. Could not anyone tell long beforehand what that decision would be? Let those who know the deciders put themselves in their places—would *they* care whether the stockholders had a "reasonable return" on their investment if *they* owned no stock? Would *they* care whether the crippling of the local utility injured outlying property or investments if they were not personally interested in such? Would anything move *them* in such a case and under their personal environment except individual benefit and selfishness? Of course they would not. Outside of a few bankers, real-estate owners and others largely and directly interested in the growth and facilities of any community, what individuals in the community realize the danger of laming or killing the local utilities, recognize and realize that danger sufficiently fully and strongly to make them decide against their personal and individual selfish interests?

If there is any "psychology" in the matter it is the psychology of personal selfish interest and if that is to be the guide in matters of utility service and emoluments and if that is to be limited to those businesses alone then it is a pretty poor prospect for them. "Lord, defend me from my friends, I can take care of my enemies." Mr. Tripp stated before the same commission that "we had all been living in a fool's paradise" and when electric transportation men and journals advocate the continuation of the very ills which "home rule" injected into the local utility business years ago and from which the business has only been at all cleared by state commissions, it would seem that a lot of us still remain in Mr. Tripp's Elysium and that we would get better and more practical results if we descended to the plains of common sense and justice.

H. S. COOPER.

Dallas, Texas, August 20, 1919.

STREET-RAILWAY SITUATION OF NATIONAL CONCERN.

The New York *Times* said recently: "Any idea that the troubles of the electric railway companies are local merely because they mostly do a local business and are subject to local regulation cannot survive the evidence now being offered to the Federal investigators whose appointment was approved by the President when he was at Paris. The operation of a thousand miles of track has been abandoned. Sixty companies have actually dismantled and junked their properties. Sixty-two companies operating 6000 miles are in the hands of receivers. The net income in 1917 was $41,800,394, and in 1918 $10,712,726. It appears to be clear that fares must be increased, or many riders must walk. Last year there were eleven billions of electric railway passengers."

This statement by one of the leading newspapers of the country shows that it has investigated this problem carefully and in an unbiased manner, and therefore in striking contrast to so many other newspapers that have shown the most violent hostility to the street-railway companies.

Editorial Comment

Electric Trucks and Tractors in Warehouses

INDUSTRIAL electric trucks and tractors offer one of the best means of solving the handling problems of storage warehouses and similar places as pointed out elsewhere in this issue. In their application for this work, however, considerable difficulty is encountered due to the design and construction of the buildings which, to a certain extent, prevents their introduction.

To entirely overcome such difficulties in existing buildings is of course impractical, but they can be avoided in future construction by a little co-operation from the rest of the electrical industry. There are very few such buildings designed where some branch of the electrical industry is not called in to act in an advisory capacity. At such times if the advantages offered by this apparatus are pointed out the design of the building can readily be modified to permit their satisfactory and efficient application.

Individuality in Daylight Saving

PASSAGE of the law repealing daylight saving over the veto of the President brings to an end after October 26 the nationally legalized practice of turning the clock an hour ahead during the summer months and thereby making available for general usefulness and recreation an hour of daylight that would ordinarily pass before the working day for most of us commenced

America is so far as we know the only country reverting to the old order of things. France, Great Britain and other countries adopting Benjamin Franklin's suggestion of saving daylight as a necessary step in economy created by the war, are adhering to a practice that proved its worth in helping to win the war. America is a backslider, not because we do not need to save coal, not because we are not desirous if not anxious to reduce our summer lighting bill by a million or more dollars, not because we do not need more time for recreation, but because a certain element or elements have created an impression that their will is the will of the majority. It is known that those farmers employing help are the ones that have opposed the daylight saving. It has also been claimed that some of the lighting utilities have opposed the same law, though no evidence was offered to verify this. But we do know that that extra hour of daylight is a boon to the city dweller and its *raison d'etre* is sound from every economic aspect.

However, it is only the compulsory observance of daylight saving that is denied us. We still have the privilege of voluntarily adhering to it or of obtaining the same benefits in other ways. It was advocated in these columns long before daylight saving became a law that the stringent custom of starting and ceasing work during the summer months during certain very narrow limits be extended and modified and in so doing reduce the unpleasantness, the delays, the dangers and the high cost of transportation. That can still be done and should be done.

We shall all gain if the employer of labor permits his employes to change their hours of commencing and ceasing work during the summer months. The employer, likewise, will gain, because his employes will be more efficient and therefore do better work. The demand upon the traction systems will be spread out over a longer period. For the power companies the summer peak will be different, less capacity will have to stand ready for service and less coal will be consumed for banked fires and peak loads.

We humans are habit-forming animals, and often our habits are not the wisest. Now that saving for usefulness that additional hour of daylight will be a matter of choice instead of necessity in the summers to come, it is hoped that the individuality in us will assert itself and that many of us will adopt our own daylight-saving habits when the summer comes back each year.

The Contractor-Dealer in the Scheme of Things

INTO almost every phase of the electric utility industry one hears mention of the contractor-dealer.

At the recent meeting of the Executive Committee of the National Electric Light Association in New York two of the matters that came up call for special reference. One of these was that of publicity, the other that of the contractor-dealer.

The N. E. L. A. is now taking up in earnest the education and assistance of the small contractor-dealer as to the sale of current-consuming appliances and merchandising methods. The contractor-dealer is part of the scheme of things, a link in that long chain of electric supply, that has come more and more interwoven into the fabric of our national life with every year. In the past, many central stations have failed to appreciate the function of the contractor-dealer or their responsibility toward him. Things are changing, have changed rapidly of late, and we look forward to the close harmony and mutual understanding between the utilities and the contractor-dealers that should exist for the welfare of both, the central-station industry as a whole, and the public whom they both serve.

Good Will and Psychology in Car Fare Increase

GOOD WILL is a very important, though intangible, asset in any business, be it mercantile, industrial or public utility. In public utility valuation the element of good will is frequently denied, on the assumption that any business which is more or less of a monopoly cannot suffer from ill will and the public *must* patronize it willy-nilly. The fallacy of making this belief general has often been exposed. Especially when severe exactions have been imposed on a utility company that could not list (often through no fault of its own) the good will of the public among its assets has the reality and value of public good will been made clear.

Probably at no time has it been more desirable to have the public good will on the side of the utilties than right now when so many of them, especially electric railways, are compelled to seek higher rates to meet rising operating costs or face bankruptcy. Through the public service commissions, which happily are now established in nearly all our states, the utilities can in most cases find at least temporary relief for the desperate conditions confronting them. In many states, however, the commissions have not been in existence long enough for the general public to fully understand their function and authority. Formerly nearly all rate cases before commissions involved rate changes downward, whereas, now when the commissions in all fairness find that rates must be raised the public does not readily grasp that the commissions are obligated to adjust rates down or up as conditions may require. Thus arises one of the chief causes for renewal of home-rule agitation, demands for curtailment or extinction of commission authority and bitter resentment at the higher rates.

We believe, and many authorities on public utility service agree on this, that the agitation for home rule and the resentment at higher rates would be largely overcome by a judicious effort of the utilities to place their case frankly before the public so "that the people may know," in the words of Mr. Henry L. Doherty, the merits of the case before it is formally brought before the commission or other body authorized to act on it. Failure to provide the preliminary publicity gives opportunity to those demagoguic interests in the community who usually are waiting for just such a chance to allege that the matter is being railroaded through some remote commission and others without thinking quickly accept this assertion of conspiracy. Thus the good will or at least fair attitude of the public that could have been gained by a candid presentation of the actual facts is replaced by the ill will toward the utility corporations that many politicians and professional agitators do their utmost to foment for their own ulterior motives.

These ideas were briefly set forth in an editorial entitled "Psychology and Car Fares" that we published in our issue of August 16. We endorsed a certain statement by Secretary of War Baker along these lines. In a letter that we publish elsewhere in this issue, Mr. H. S. Cooper of Dallas, Texas, well known as the secretary of the Southwestern Gas and Electric Association for many years, takes spirited exception to the editorial in question. It may be that on account of the discomforts of a torrid day the idea aimed at was not presented very clearly, but Mr. Cooper reads into it much more than was intended, especially when he accuses us of favoring home rule and attacking commission regulation of public utilities. As other readers may have misunderstood our stand on the question, we take this opportunity to make it clear.

The ELECTRICAL REVIEW has for over ten years been a sincere and consistent advocate of commission regulation and has on countless occasions shown the fallacy of arguments seeking to have home rule of utilities restored. The evils so commonly connected with home rule, especially that of keeping utility questions in politics, have been repeatedly exposed, as have also the common shortcomings of municipal ownership. Instead of attacking commission regulation, we have warmly advocated its extension so as to give a single state commission full power to solve even the labor problems of the utilities. We have no apologies to make for this steadfast attitude toward utility regulation and pride ourselves that among our constant readers there are not a few who have commended us for taking a stand on this question in advance of current practice.

Utility commissions, like the courts, are not publicity mediums. Their function is to weigh the merits of the case and render a decision thereon which is made public, usually with a review of the salient features of the case. But a very small percentage of the public studies the decision and the evidence on which it is based. The time for publicity in a public utility case is chiefly before the case is presented in detail to the commission so that the public may have a grasp of the essential facts at issue before the decision is rendered and therefore will be prepared to see the wisdom thereof. Several electric railway companies have through newspaper advertising or pamphlets distributed among their patrons presented simple and clear statements of the facts and figures of increased costs and thereby gained the good will of the patrons toward the increased fares that were inevitable in spite of all possible economies.

In Illinois the central station, gas, electric railway and telephone utility associations have formed a mutual Committee on Public Utility Information and the National Electric Light Association is right now considering the creation of similar publicity committees in the other states. This shows that the idea of more extended and persistent utility publicity is gaining ground. It is bound to increase the good will of the public toward the utilities.

Current Events

Report of Michigan Meeting — Plans for Pennsylvania Convention — N. E. L. A. Activities — Electrical Shows

MICHIGAN SECTION, N. E. L. A., HOLDS BIG CONVENTION.

Many Subjects of Central-Station Interest Discussed at Largely Attended Meeting at Ottawa Beach, August 26-28.

The first meeting in three years of the Michigan Section, National Electric Light Association, proved a very successful affair on Tuesday, Wednesday and Thursday of this week. It was the sixth annual convention and was held at the Hotel Ottawa, Ottawa Beach, Mich. An unusually large number of members and guests was present.

The first session opened Tuesday morning with the presentation of the address of President Thomas Chandler, Sault Ste. Marie. Mr. Chandler was in active service as a captain of engineers during the late war and during the summer of 1918 he went to France with the 56th Engineers, an anti-aircraft searchlight organization. In his address he referred to the excellent manner in which the association's affairs had been conducted during his absence. He then discussed important topics of the day, dwelling on daylight saving, the great demand for house wiring and electrical appliances, the need for greater economies and higher rates to meet increased costs, more careful consideration of the subject of rates, training and education of employes, the new Michigan Utilities Commission, and association matters in general.

After the appointment of some committees, a paper on "Courtesy" was presented by John Swanson, Consumers Power Co. This pointed out the importance of courteous treatment of patrons by all utility employes who come in contact with them, whether directly or by means of the telephone. The subject was discussed by Herbert Silvester, F. A. Newton and R. A. Gordon. These speakers pointed out that courtesy can do a great deal to develop the good will of the public.

A paper on "Electrical Merchandising" was presented by A. H. Touscany, Detroit Edison Co. This reviewed especially the work that is being done in Detroit and nearby cities in the sale of cleaners, washing and ironing machines, electric sewing machines and other appliances. Many important points were brought out. This paper will be treated at greater length in an early issue.

Discussion of the subject was opened by Mr. Johnson, of Jackson. The sale of merchandise by the Consumers Power Co. of that city amounted last year to $15 for each meter installed. This compares favorably with the revenue received from lighting accounts. The sale of appliances has also been the means of increasing the load-factor. The discussion turned to the question of whether it is undignified for a central station to push the sale of appliances by house-to-house canvass. Mr. Touscany thought that it was not proper for the central-station company to do this. Mr. Johnson stated that in one of the Ohio cities a list was made up of central-station customers who did not have any electrical appliances. The list was divided into groups of 20 names which were given to separate salesmen with 20 flatirons each. Results showed that 18 to 19 of these 20 patrons bought the irons. H. H. Koelbel said that it was a bad thing to permit department stores to sell cheap heating appliances, as it has a tendency to injure the appliance business.

"The Central Station and the Contractor-Dealer" was the subject of a very interesting paper by R. A. Gordon, Houghton County Electric Co. In this paper the relationship of these two branches of the industry was discussed and the conscientious efforts being made by both to come together on a common ground and co-operate were shown. The author is strongly in favor of this movement and stated that the task of forming or promoting joint co-operative organizations wherein all branches of the industry would be represented should be the task of the central stations and they should welcome the opportunity to perform this service. He explained the great need for co-operation in the electrical industry at the present time and the attitude of other organizations, particularly the National Association of Electrical Contractors and Dealers, towards such a movement. He also gave several valuable merchandising suggestions and pointed out the advantages of a proper merchandising policy.

On Tuesday evening William A. Durgin, Commonwealth Edison Co., Chicago, presented an illustrated lecture and demonstration on industrial lighting, using a special model for effectively showing the very superior results obtained when a good system of general illumination is installed.

H. J. Burton, Consumers Power Co., in his paper entitled, "Working Safely on High-Tension Lines," discussed the hazards of working on power lines, taking up the dangers due to induction, lightning, falling objects as well as those due to electric shock from a live circuit itself. The selection of men for the work, construction of lines and the importance of training men were taken up, after which Mr. Burton discussed individually insulating tools and appliances, rubber gloves, shields and protectors, linemen's spurs, safety belts, boots, coats and similar equipment. He described special tools necessary to permit insulators to be changed with safety on live lines and the precautions that should be observed in work of this kind.

The evening session was concluded with the showing of a two-reel educational film, "The Queen of the Waves." This showed the wonderful progress being made of the use of electricity in navigation.

On Wednesday morning the first paper presented was by Robert Davey, of the Consumers Power Co., entitled "Accounting for Plant Investment of Public Utilities." This paper discussed the various methods used in making the yearly budget and accounting of same.

James V. Oxtoby, a prominent attorney of Detroit, then made an address on "The New Public Utilities Law." He briefly explained that the new Public

Utilities Commission created by the last Legislature has replaced the former Michigan Railroad Commission and has all the powers of the former body. It also has the power to make rates. All new rate schedules proposed must be sent to the Commission but are not effective until approved by it. F. A. Newton, Consumers Power Co., who was formerly associated with the Wisconsin Railroad Commission, urged that a committee be appointed to help the members keep informed as to the activities of the Commission. Rates should be made so that each class of service makes a fair profit. He strongly advocated getting and keeping records of costs and income so that new rates can be made which are proper for each class of service.

On Wednesday evening was held the annual banquet at which the principal speaker was F. G. R. Gordon, of Haverhill, Mass., who delivered a very instructive address on "The Trend and Menace of State Socialism in America." This was followed by an entertainment program. A report of the concluding sessions of the convention will be given in our next issue.

LARGE ATTENDANCE EXPECTED AT PENNSYLVANIA CONVENTION.

Program Includes Many Noteworthy Speakers and Elaborate Entertainment Features.

The approaching convention of the Pennsylvania Electric Association, to be held at Bedford Springs, Pa., Sept. 3 to 6, inclusive, is confidently expected to be the best of the many successful and enthusiastic gatherings of this association.

Among the guests of honor who will deliver addresses are included the Hon. Wm. C. Sproul, Governor of the Commonwealth of Pennsylvania; the Hon. Wm. D. B. Ainey, chairman of the Public Service Commission, and Walter H. Johnson, vice-president of the National Electric Light Association.

The papers to be presented at this convention form a well balanced group, covering those phases of the industry which are uppermost in the minds of those responsible for the success of the central station.

A condensed outline of the program follows:

Thursday, 10 *a. m.*—President Sproule's address; reports of officers and committees; appointment of committees.

Thursday, 8:30 *p. m.*—Address by Gov. Wm. C. Sproul of Pennsylvania; address by Wm. D. B. Ainey, chairman, Public Service Commission; address by W. H. Johnson, vice-president, N. E. L. A.

Friday, 10 *a. m.*—Paper, "The Effect of the War on Boiler-Room Practice," by John A. Barnard, combustion engineer, Philadelphia Electric Co.; "Economical Boiler-Room Practice for Medium-Sized Plants," by H. B. Bryans, engineer, Counties Gas & Electric Co., Norristown, Pa.; "Selecting a Switchboard for a Plant of Moderate Size," by G. E. Wandle, assistant general manager, Lycoming Edison Co., Williamsport, Pa.; "Management and Men," by H. P. Weaver, general manager, Independence Bureau, Philadelphia.

Friday, 2:30 *p. m.*—Paper, "Increasing Capacities of Existing Lines and Cables," by E. C. Stone, system operator, Duquesne Light Co., Pittsburgh; "The Story of Insulations," by C. E. Skinner, Research Division, Westinghouse Electric & Manufacturing Co.; "Meter Department Practice in a Large Scattered Territory," by E. H. Tyson, superintendent meter department, Lehigh Valley Light & Power Co., Allentown.

Saturday, 10 *a. m.*—Paper, "Isolated Plant Costs as Influenced by the War," by John Meyer, Philadelphia Electric Co.; "Power-Factor Correction by Means of the Static Condenser," by O. C. Roff, General Electric Co.; reports of committees, election of officers.

A novel feature of the convention will be an exhibition by some 30 manufacturers, the displays being made in a large tent that will include a club section.

The return of the social features of the convention will be welcomed by all as affording the opportunity for renewing that goodfellowship which always characterized the "pre-war" conventions of this association.

ATLANTIC DIVISION SUPPLY JOBBERS TO MEET.

Next Meeting of Supply Jobbers to Be Held Sept. 17 in Philadelphia.

The Atlantic Division of the Electrical Supply Jobbers' Association will hold its next meeting at the Bellevue-Stratford hotel, Philadelphia, on Sept. 17. The meeting will be held in two sessions, both of which will be open. The first meeting will be called at 10:30 a. m.

A special effort will be made at the hotel to provide jobbers and manufacturers with information as to the names of those representatives who are present at this meeting. For this reason all attendants are requested to register upon their arrival when they will be provided with an identification badge.

According to present indications, a large number will attend this meeting and an interesting meeting is anticipated. Those expecting to be present or represented should notify the secretary, E. Donald Tolles, 52 Broadway, New York City, as early as possible.

AIMS OF THE GEOGRAPHIC SECTIONS OF N. E. L. A.

[Responding to a request for his ideas in relation to the scope and objects of the Geographic Sections, President R. H. Ballard, of the National Electric Light Association, transmitted to President Thomas Sproule of the Pennsylvania Electrical Association, the following in communication form in connection with a letter expressing regret at his inability to attend the convention of that organization which convenes at Bedford Springs, on Sept. 4.]

In the Geographic Section we provide the electrical industry with the intermediating link between the central station, which is the unit of activity from which ideas naturally germinate, and the National Electric Light Association, which is transcontinental in its policies and its aims.

In the Geographic Section the greatest opportunity is offered for personal contact and interchange of ideas between executives and employes of the companies and all others interested in the electrical industry within the territory where conditions are frequently identical and usually similar.

In the Geographic Section the results of progress made and new ideas demonstrated by one company, may be quickly conveyed to other companies in the same territory.

In the Geographic Section opportunity is afforded men to think in broader terms and to apply their reasoning along sectional lines. This is the logical

sequence of development—company to section; section to nation.

The natural foundation for this line of progress is the company sections, and its importance is inestimable.

In the Geographic Section the maximum opportunity is presented for cementing all branches of the industry into one harmonious whole; of increasing the sphere of influence exercised by those engaged in our profession, and in eventually creating a better understanding between the public served and those whose duty it is to serve the public.

In the Geographic Section a complete understanding should be reached between central stations, manufacturers, jobbers and contractor-dealers, as to the rightful place in the industry occupied by each group and in establishing the relations of one branch of the industry to the others.

In the Geographic Section we have a place where misunderstandings, frictions, petty jealousies and fancied injuries can be ironed out and adjusted by bringing about a full and complete realization by all members of the section of the responsibility of service to the public and the joy of working out practical accomplishments of the ideal.

In the Geographic Section can best be worked out a definite plan by which the public may be kept informed on the true status of utility service in the district served.

In the Geographic Section there is ample opportunity for constructive initiative, and the opportunities for its exercise could be amplified indefinitely the scope of achievement having no limitation but brains and ability.

In the Geographic Section we have the medium of crystallization; demonstrating and applying locally when local, and making universal when universal all of the constructive creative forces that exist in the minds of the great membership of the National Electric Light Association.

SITE FOR NEXT N. E. L. A. CONVENTION TO BE SELECTED IN SEPTEMBER.

All Southern California Cities Are Eager for Meeting—Executive Committee to Decide Next Month.

Already there is an interesting rivalry among the cities of Southern California for the honor of being selected as the place of holding the 1920 convention of the National Electric Light Association. The news that the next convention of the national organization was to be held somewhere in the southwest was well rated by the committees of city councils and chambers of commerce of the larger cities of the southwest, and President R. H. Ballard is in receipt of a number of invitations which he will submit to the Executive Committee at its meeting in September. A selection will no doubt be made at this meeting, after which the first preliminary work for the session will be put under way.

Los Angeles, the metropolis of the southwest, with a national reputation as a convention city and rated for the hospitality it extends to those who visit it as representatives of important organizations, is eager to secure the convention. Its magnificent hotel accommodations, its central location, its proximity to the chain of beach resorts and its wonderful roadways and interurban electric lines, radiating in all directions, have much to commend it.

Pasadena, the Crown City of the San Gabriel valley, under the shadow of Mt. Wilson and in the center of some of the most beautiful scenery in Southern California, and only nine miles from Los Angeles, would be an ideal place for the session.

Riverside, in the center of the great orange and lemon belt with superb scenery on every hand and close to some of the great hydro-electric plants, desires to be considered.

San Diego, on one of the most remarkable natural harbors in the world, with magnificent hotels and all of the attractions that eastern visitors enjoy, has presented its claims.

Santa Barbara, the romantic and historic city by the sea, with its lore of other days, its wonderful old mission, some of the best hotels in the west and excellent facilities for entertaining, has also put in a request for the coveted honor.

President Ballard says he will try to present all of these requests to the members of the Executive Committee in as impartial a manner as possible, requesting the members to make the selection, as he feels those who reside in other sections of the country should be best qualified to choose the place that would best suit the visitors to Southern California.

EXECUTIVE COMMITTEE, N. E. L. A., HOLDS MEETING IN NEW YORK.

August Meeting Hears Reports and Plans for the Year's Work by Sections and Committees.

A meeting of the Executive Committee of the National Electric Light Association was held at the headquarters in New York City on August 14, attended by 17 men. In the absence of President Ballard, Vice-President Martin J. Insull presided. Treasurer H. C. Abell submitted a budget for the year ending June 30, 1920.

In connection with a discussion concerning the necessary reprinting of the Salesman's Handbook and the Overhead Line Construction Handbook, the general question of the method of distribution of these and other handbooks to the membership was brought up and was referred to a special committee which will report at the next meeting of the Executive Committee. John G. Learned was appointed chairman of this committee, of which the other members are the chairman of the Membership Committee, the chairman of the Company Sections Committee, the treasurer, and the chairmen of all national sections issuing handbooks.

Chairman Perry presented the report of the Exhibition Committee, reviewing the work done in advance of the convention scheduled for Atlantic City in 1917 and the work accomplished this year. He reported that prizes of $150, $100 and $50 for the best papers describing the exhibit as a whole had been awarded, that there were 85 exhibitors this year, the largest from the standpoint of number and square feet of space in the history of the association, and that 25 exhibitors had to be refused on account of their late applications. Mr. Perry also reported the list of officers and members of the Executive Committee elected for the year 1919-1920, which was given in the ELECTRICAL REVIEW, May 24, 1919.

Acting-secretary Sewall presented numerous applications for membership, the applicants being elected as follows: Class A 6, Class B 199, Class C 1, Class D 7, Class E 4, foreign 1; total 218. Mr. Sewall also presented the membership report as of July 31 showing a membership of 10,202 divided as follows: Class

A, 1059; Class B, 7812; Class C, 91; Class D, 273; Class E, 923; foreign, 44. This total of 10,202 compares with 11,209 on July 31, 1918, and means a net loss of 1007.

Mr. Insull read a letter from E. W. Lloyd which stated the Committee on Insurance Matters appointed at the last Executive Committee meeting felt that the interests of the N. E. L. A. with regard to insurance questions—such as the relative rating of electrical apparatus and other properties, and keeping in touch with the laws of the different states as to the possible liabilities of central-station companies as to fires and accidents caused by wiring beyond their control, etc.—should be under the control of the association working through a committee composed of members of the Technical and Commercial Sections. It was voted that the question of a committee on this subject be referred to President Ballard.

Vice-president Insull reported that John F. Gilchrist had accepted appointment as chairman of the Publicity Committee, and Mr. Insull read a letter from Mr. Gilchrist outlining his plans, which provide for the establishment in each state of a committee on public utility information similar to that already organized in Illinois, which committees will finance themselves and will furnish news bulletins to their members; the chairmen of the state committees are to form the personnel of Mr. Gilchrist's main committee. Mr. Gilchrist felt that it would be desirable to include the railway, gas and telephone interests, and that this would probably mean that in some cases the chairmen of the state committees would not be electrical men, but he did not feel there was any objection to this.

Mr. Insull also read a letter from President Ballard outlining his plans for his September trip East, stating that he planned to call a meeting of the Executive Committee during his visit, and suggesting the advisability of holding a national conference at that time and also a meeting of the Public Policy Committee. The question of a conference was discussed and it was felt that such should be held under the direction of the Public Policy Committee.

Vice-president Smith reported that he had asked Arthur Williams to serve as chairman of the Bulletin Committee; this appointment was confirmed. Mr. Smith also suggested that the personnel of this committee should include S. A. Sewall, Walter Neumuller, S. H. Giellerip, and the chairmen of the National Special Sections.

Mr. Insull reported that John F. Gilchrist and John G. Learned had represented the association at the convention of the National Association of Electrical Contractors and Dealers in Milwaukee in July. The principal subject discussed was a plan for educating the small dealers and contractors in selling appliances. The manufacturers agreed to raise a certain sum provided the other interests would recommend the plan. Mr. Gilchrist had advised Mr. Insull to recommend to the N. E. L. A. that its members approve the plan and endorse it, but he felt that no steps should be taken until the plan had been worked out more in detail.

Mr. Learned added that the only action the association could take would be to recommend to the members that they support the plan. The money will be raised locally and will be spent locally. He suggested that when it is decided to take any action, a letter should be sent to Class A member companies. He also called attention to the fact that in the Commercial Section a new committee has been appointed on relations between contractors, dealers, jobbers and manufacturers. On motion it was voted to refer this matter to the Commercial Section to report at the next meeting.

Chairman Foster of the Electric Vehicle Section reported progress and stated that all of the committees are actively at work, with the exception of the Insurance Committee whose work will be held in abeyance until a decision has been reached on the suggestion that a general committee on insurance be appointed.

Mr. Foster also reported that it had been brought to his attention that the municipal authorities of New York City were investigating the broad subject of harbor, steamship and railroad terminal facilities, including the transportation of freight over the city streets to such terminals and the handling of materials in the terminals. As the street transportation phase of this investigation is closely associated with the electric vehicle, Mr. Foster thought that efforts should be made to bring to the attention of the commission investigating this matter the merits of electric transportation. While this, of course, is purely a local situation, the recognition of the electric vehicle in solving this problem is of national importance, and therefore the co-operation of everyone concerned, particularly the central-station interests in and about New York City, is very essential.

For the Commercial Section Chairman Learned reported that a two-day meeting had been held at Association Island during the first week in August, at which time the bureaus and committees were appointed.

ELECTRICAL EXPOSITION WILL REOPEN GRAND CENTRAL PALACE.

Famous Exhibition Building Being Reconverted from Gigantic Army Hospital.

Having done its bit by serving effectively as an Army hospital, Grand Central Palace, New York City's largest exhibition building, is about to resume its normal peace-time status. Its return to the field of industrial exhibitions will be signalized on Sept. 24 next when the Electrical Exposition opens there for its customary run of 10 days. Excepting last year when the great electrical industry was too busy helping win the war to take time to show its latest inventions to the public, this exposition has been held annually in New York since 1907.

A large force of skilled workmen is now busily engaged in restoring the exhibition floors of Grand Central Palace to their original state. Already the numerous partitions built in making hospital wards have been removed, as well as the big theater constructed on the main floor for the entertainment of patients. An idea of the extent of this interior reconstruction is had from the fact that as many as 3700 bed patients have been there at one time, and besides the wards there were offices, reception rooms, operating and dressing rooms, mess halls, kitchens, store rooms, etc.

One hospital feature will remain as a part of the electrical exposition. This will be an electric therapeutic exhibit by the Medical department of the Army. It will serve to train doctors in the many new uses of electricity in the theraputic field and to enlighten the public on the benefits possible therefrom. As a whole this year's Electrical Show will be more varied and interesting than heretofore because this time it will disclose two full years of developments in the electrical field.

BIG ELECTRIC SHOW TO BE HELD IN BUFFALO.

All Branches of Industry Co-operating for Success of Show to Be Held Oct. 16 to 25.

Plans are being rapidly completed for the Buffalo Electrical Show to be held in Buffalo, N. Y., Oct. 16 to 25. This is the first show of its kind to be held in that city since 1914 and according to present indications will surpass all previous shows in every respect. Although the show is to be conducted under the auspices of the Buffalo Electric Show, Inc., of which Edmund D. McCarthy is chairman, all the electrical interests of Buffalo are taking an actual part in the arrangements by representation on the various committees through the officers and members of the Buffalo Electric Club.

The Broadway Auditorium, where the show will be held, is the largest hall in Buffalo for such purposes. It is centrally located, being accessible by direct car lines from all sections of the city and within easy walking distance of the principal hotels. A large portion of the available exhibit space has already been purchased by prominent manufacturers and this feature promises to be especially interesting.

The decorations and color scheme are elaborate and designed to make the most artistic and pleasing impression upon the public on entering the hall. An artistic and spectacular illumination is assured by the fact that W. D'Arcy Ryan, illuminating engineer of the General Electric Co., has been consulted and the arrangement of the exhibits will be governed by the illumination plan for the inside of the hall. Broadway, from Lafayette Square at Main street to the Auditorium, will be generously illuminated.

The program of the show will be an attractive souvenir filled with interesting articles on the history of the art and descriptive of the electrical development on the Niagara frontier as well as that brought about by the war and the use of the wireless telephone and aeronautics.

GREATER POSSIBILITIES FOR SOCIETY FOR ELECTRICAL DEVELOPMENT.

Letter to Members Outlines Present Activities and Urges That Duplication of Effort Cease.

The following letter has been sent to all the members of the Society for Electrical Development by J. M. Wakeman, general manager, and gives an interesting and timely resume of the important work that is being carried on:

It is evident that the Society for Electrical Development should "get its story across" to more men in the industry.

Do you realize what it does?

For the past five years this society has been getting the finest kind of publicity for the industry in the best magazines and newspapers of the country. The list of publications using stories, articles and material supplied by the society has been printed and sent out over and over again.

The statistical development of this society has more information filed and available covering applications of electricity to the various manufacturing industries than has any other organization.

This society has for 5 years been supplying member contractor-dealers, jobbers, manufacturers and central stations with sales ideas, writing advertising copy, laying out sales campaigns, supplying cuts, mats and other material without charge.

The "Special Service" department is under constant pressure responding to the calls for information, suggestions, articles, etc., from the general public, the industry, the trade press, popular magazines and newspapers.

And yet, in spite of all this, every now and then someone suggests that some association ought to render such services to its members, convince the public of the advantages of electricity, gather statistics, help the dealer with sales ideas, write advertising copy, etc. Generally, the meeting at which such suggestions are made receives them with enthusiasm and decides to go ahead. A great shout goes up that real co-operation is assured!

For other organizations to duplicate the work of the society is wasted effort; it would not be attempted if everyone knew what this society does. There is plenty of work to be done without duplication.

Won't you as a member of this society help to "get the story across"? Printed matter alone won't do it. The assistance of our members is needed to tell it. The staff tells it but the number they can reach is comparatively small. If all our members would tell it, the society's activities would quickly become known and efforts at duplication cease.

PLANS FOR MEETING OF MINING AND METALLURGICAL ENGINEERS.

Chicago Meeting in September to Include Inspection Trips in Addition to Over 150 Papers.

In view of the large number of coal mines centered about Chicago, it is planned to make the Chicago meeting of the American Institute of Mining and Metallurgical Engineers to be held at the Congress Hotel Sept. 22 to 26, of especial interest to the coal industry. A large proportion of the 150 technical papers prepared for discussion will be on subjects related to coal, coal mining and coke. Among these is a carefully prepared symposium on sulphur in coal. Excursions have been arranged during the meeting that will be particularly attractive to the coal man; on Thursday the trip to La Salle will include the inspection of operating coal mines in the district, and late Thursday night a party will leave for the mines in Franklin and McCoupin counties, where some novel and ingenious ideas in plant design and methods of operation have been adopted and proven practicable. The trip to the Gary steel mills on Tuesday will include an inspection of the immense coke ovens and by-product plant.

Metallurgists and electrical engineers will be much interested in the demonstration to be made of the production of metallic tungsten and molybdenum at the plant of the Fansteel Products Co., North Chicago, on Tuesday, Sept. 26. As a part of the program for the Chicago meeting, an excursion has been arranged to Milwaukee, to visit the various mining machinery plants in the vicinity, and a stop will be made en route at the Fansteel plant. The entire metallurgical process will be shown, from the preparation and purification of the commercial concentrates, and including sintering the pulvurent metal obtained into homogeneous billets by the use of currents of enormously high amperage.

The National Exhibit of Chemical Industries is being held at the Coliseum, Chicago, the same week as the Institute meeting.

Commercial Practice

Line Extensions in Small Communities — Central-Station Employes Buy Government Food—Detroit Operating Costs

LINE EXTENSIONS IN MEDIUM AND SMALL SIZED COMMUNITIES.

Important Problem Discussed in Paper Read Before Southwestern Gas and Electric Association.

By B. F. Cherry,
Weatherford Water, Light & Ice Co.

When first assuming the management of our plant a little more than eight years ago, I found no set rule for making electric extensions. The price of line material was, at this time, very reasonable, so we decided in making line extensions to set one pole and run one span of wires for each new customer who would agree to use our electric service for at least twelve months. We tried this plan and to a certain degree it was a success. We received many orders for extensions and had a large increase in the number of customers.

When the price of line material of all kinds began to advance, my knowledge and experience began to advance also. We soon saw that the original plan must be discontinued and a new one established. To make this change we decided to set only one pole as an extension for every two customers who would agree to use electricity for lighting and other purposes for a period of at least twelve months.

After using the above mentioned plan for about two years we stopped, and after reviewing the new customers whom we had secured during these two years by our extensions, we decided that our plan was a failure. The plan was a failure for many reasons, but I will mention only two here. First, not more than 50% of our new customers carried out their agreement as to the length of time that they would use the service; secondly, the more we gave, the more they expected and demanded. They expected too much, and so it was a very difficult matter to satisfy them.

The next move was to study out a better plan and to try to correct the mistakes that had been made. It is an easy matter to make an error but a most arduous task to correct one. That was my experience in this instance.

What I had experienced and observed during these two years as manager of a central station in a small town led me to believe that a man who had heretofore neglected having his home wired for electricity and who had not had the pleasure of using electric lights and other electric conveniences, when he did start using these and began to enjoy the full 100% of service that we, or any other central station in a medium sized or small town should give, that man really got more out of the service than so much per kilowatt-hour.

Going on the theory that "That which costs the most is appreciated the most," we decided to check up a little on soliciting new customers and making new extensions and to adopt a plan whereby the would-be customer must pay for something more than merely the wiring of his house. Now, man to man, it is nothing but just and right that he should.

For any and all new extensions we would stand half of the expense, while the person, or persons, desiring the extension must pay the other half; the line was to be our property, we, of course, to maintain the same; or, if the person, or persons, desiring the extension preferred, they could stand the entire expense of the extension and we would pay back to them in monthly payments the entire cost of same at the rate of 50% of their monthly electric bill for current consumed. We would, of course, advise and talk up the plan of equal division of expense, arguing that with this plan there would be no unfinished business to bother with or possibly have trouble over, and, with the exception of a few extensions for motor service, this plan was favorably received and was, or is, a great success.

Occasionally we would be confronted with the argument that we should stand the entire expense of the extension, for the reason that they would have to pay us for all current consumed. This can be answered in many ways, but we always referred them to the fact that an electric line running to, or by, their home would enhance the value of the same more than the entire extension cost, to say nothing about the fact that we stood half the cost and when it was necessary.

A few times we have had to meet the argument that we should make an extension free of charge for the reason that the party desiring same had to pay the high city tax. To this we frankly assured them that they did not have to pay one cent of the city tax on account of the electric light plant being located or doing business within the city limits. In every instance, in connection with an extension, we make, or try to make, the party feel and know that in his getting the extension and our electric service, he is favored just as much as the central station and that we were under no more obligation to him than he was to us, on account of the deal.

One other thing that has been a great help to us in the way of extensions is the fact that we wire houses. In almost 50% of the cases where a party desires electric line extended to his home or property, he will simply ask what it will cost to put electric lights in his home, and then, of course, we would figure the line extension, house wiring, etc., and give him the total cost in a lump sum, and since we do house wiring at practically cost of time and material, he could get electric lights in his home for a less amount that he would if we had stood the entire cost of the extension and if he had to have gotten an independent contractor to have wired his house. And when it becomes necessary to close the deal for an extension, we explain and make this fact plain to them.

After eight years of just such experience, my advice to any and all central-station managements in medium-sized or small towns is, first, to get ready

to deliver the goods, give good service, full one hundred percent, and then put into the minds of the people that you serve, or may serve, that while you are their servants you are not beggars but instead give full value for everything received. Above all, don't beg too hard for new business or extensions. This may work in the cities, but will not in small towns, or that has been my experience. I would rather have one new customer who applied to me for the extension, or service, than to have two or three whom we would beg into taking the same, for one satisfied customer is worth more to any central station than two or three, or even more, disgruntled customers.

I feel sure that our plan of extension will be adversely criticized, for the reason that we do not go minutely into the cost of and the probable return that we might expect from same, and without due consideration and study it would seemingly be a just criticism. However, our experience has been when a man is willing to dig down into his pocket and pay for one half the cost of the extension or pay all of it to get it returned to him in small bits, he is interested enough to make a good customer and the return from such an investment is, in almost every instance, satisfactory.

So far we have had no one to try to force us to make an extension, and have made estimates on a number that did not go through. If extreme care is taken to explain in detail all the matters in connection with an extension, I hardly think there would be any trouble over an extension where a system similar to ours is used.

CENTRAL STATION ASSISTS EMPLOYES IN PURCHASING FOOD.

Commonwealth Edison Co. Buys Food at Government Rates for Distribution Among Employes.

In order to make it more convenient for the employes of the Commonwealth Edison Co., Chicago, to take advantage of the government rates on surplus army and navy food, notices were sent out during the sale advising the various departments that orders for canned goods could be given through the Commonwealth Edison Section of the National Electric Light Association. This organization had arranged to purchase a large supply of this food from the Government. Any employe with the company for three months was eligible, and the order was not to exceed 25% of any employe's monthly salary.

All orders were accepted up to noon, Aug. 21. Cash accompanied them when convenient, but if the employe so elected, the company advanced the money. This money to be refunded by the employe by Oct. 15, $10 to be taken on the first pay day after placing the order, and the remainder at the rate of $10 each semi-monthly pay day. The orders will be filled by the Stores department and delivered just as soon as the supply is delivered by the Government.

COAL CLAUSES SHOULD BE ABOLISHED.

In connection with a decision in a rate case brought by the Slate Belt Electric Co. against the Pennsylvania Utilities Co., of Easton, Pa., in favor of the latter, which furnishes energy for the operation of the Slate Belt Company's electric railway lines, the Pennsylvania Public Service Commission points out the fallacy of coal clauses in contracts for electric power, saying as follows:

"The total clauses were brought about by the war with its rapid fluctuations of prices for fuel and were perfectly proper in the emergency. With the return of price stability, however, they have almost passed out of tariff structures, and while the Commission does not view them as illegal, there no longer appears a reason for their retention, and they should be superceded by more definite rates carried into tariff schedules and calculated to produce the required revenue."

The present rates of the Pennsylvania Utilities Co. are pronounced as "just and reasonable."

EFFECT OF MATERIALS AND LABOR COST UPON COST OF OPERATION.

Data for Twelve Months Applies to Detroit Edison Co.'s Connors Creek Station.

The accompanying figures, compiled by the statistical department of the Detroit Edison Co., showing details of comparative kilowatt-hour costs covering various twelve months' periods, are very illuminating, showing, as they do, the actual results in operating following the fluctuating of materials and labor.

COMPARISON OF PRODUCTION EXPENSE PER KW-HR. OUTPUT
CONNORS CREEK POWER HOUSE

	Twelve-Month Periods Ending—					
Production.	June 30, 1916.	Dec. 31, 1916.	June 30, 1917.	Dec. 31, 1917.	June 30, 1918.	Dec. 31, 1918.
Operation—						
Superintendence	$0.013	$0.013	$0.010	$0.010	$0.009	$0.009
Wages	.043	.042	.047	.050	.055	.061
Fuel	.158	.174	.240	.325	.368	.382
Water	....	....	....	....	....	....
Lubricants	.001	.001	.001	.001	.001	.001
Station supplies and expense	.005	.006	.005	.005	.006	.009
Maintenace—						
Station buildings	.006	.007	.011	.010	.008	.007
Steam equipment	.019	.016	.019	.024	.025	.023
Electrical equipment	.003	.003	.001	.001	.002	.001
Total	$0.248	$0.262	$0.334	$0.426	$0.474	$0.493
Kw-hr. output—net	125,158,800	162,117,600	210,039,700	249,192,200	280,814,700	327,020,500
Maximum demand (30-minute)	35,000	36,000	50,000	58,000	59,000	80,000
Average load	14,300	18,500	23,900	28,400	32,100	37,300
Load-factor	.409	.514	.478	.489	.544	.466
Coal per kw-hr.—lb.	1.44	1.45	1.52	1.61	1.63	1.63
B.t.u. per kw-hr.	19,700	19,800	20,040	20,470	20,930	20,900

Operating Practice

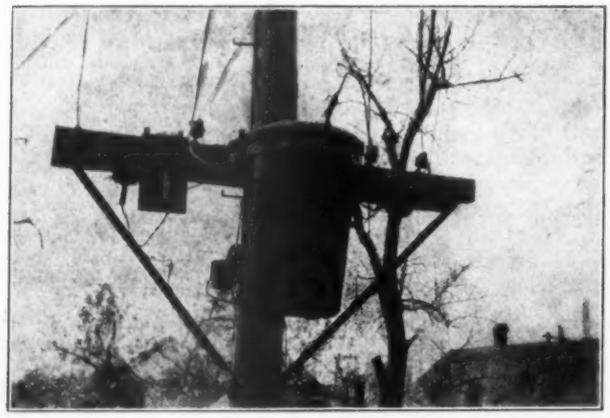
Measuring Distributing Transformer Demand—Insulating Outdoor Wires—Furnace Loads—Eliminating Harmonic

MEASUREMENT OF LOAD ON DISTRIBUTING TRANSFORMERS.

Considerations Involved in Measuring Demand—Practice of Commonwealth Edison Co.

It is frequently necessary and often desirable to know the actual or approximate load which is carried by a distributing transformer. In working up data, such as the load-factor of a certain class of business, the exact load carried by the transformer must be determined. If the estimated load on a transformer of 15 kw. or larger is near 100%, it is advisable to make tests of the actual load before connecting any new customers having a relatively large demand. For economical distribution the transformer size should be adapted to the load, with a reasonable allowance, of course, for future business. An over-sized transformer requires heavier supporting equipment and is also less efficient than a transformer nearer the size of the load. An overloaded transformer is a hazard. Due to excessive transformer drop, the voltage will be below normal. It may burn out any time with resultant interruption to service and may possibly open the primary circuit.

There are several sources for selecting transformers which are to be measured. The record of connected load or local conditions might indicate that the actual load is close to the transformer rating. If through voltage tests made in a pressure survey on account of a complaint of poor service it is found that the voltage at the transformer is low when the primary pressure is known to be normal, the transformer is likely to be overloaded. The repeated blowing of primary fuses may be due to a heavy overload. If the average demand factor for all transformers on a circuit, as determined by the ratio of the maximum kv-a. indicated by station instruments to the connected kv-a. transformer capacity, is near 100%, it is reasonably certain that some of the transformers are overloaded. The selection of transformers suspected of being overloaded will then have to be made by one or more of the methods mentioned.



Maximum Demand Meter Installed Upon Pole for Measuring Demand on 25-Kw. Transformer.

The simplest and easiest way to determine the maximum load carried by a transformer is by means of a Wright demand meter connected in the primary side. A method of installing the meter is shown in the accompanying illustration. A Wright demand meter is mounted on a board which is fitted with hangers so that it can be hung from a crossarm. Rubber-covered leads from the meter are connected to a wooden plug which is made exactly like the primary porcelain fuse plug. For convenience in handling this special plug is fitted with a large handle through which the leads are passed. The primary fuse plug on the neutral side of the transformer to be measured is removed and the wooden plug is substituted. This makes an inexpensive equipment which is entirely satisfactory for measuring transformers to 40 or even 50 kw. For measuring larger transformers it is advantageous to use a recording ammeter and split-ring current transformer. The chart will show the characteristics of the load, which will allow one to take into account diversity when determining if new load can be connected. The ammeter must be mounted in a weatherproof box which can be hung from a crossarm. A split rubber hose should be slipped over the lead to be measured before the split-ring transformer is clamped on, and the transformer should then be covered with a waterproof cloth. If quick and approximate results are wanted the measurement can be made with a split-ring transformer and indicating ammeter at the time when it is thought that the maximum demand occurs.

It must be borne in mind that these tests must be made at the time of the year when the transformer is carrying the heaviest load, otherwise due allowance must be made for the seasonable increase in load.

The illustration shows a Wright demand meter as installed by the Commonwealth Edison Co. for metering the maximum demand on a 25-kw. transformer.

CONSENSUS OF OPINION FAVORS WEATHERPROOF WIRES FOR 4400 VOLTS.

A circular letter sent out by a committee appointed by the Hydro-Electric Power Commission of Canada to determine the sentiment for and against weatherproof covering for conductors carrying high-potential currents has brought out some very interesting information as to the opinions of practical men engaged in the construction and maintenance of overhead lines. R. H. Martindale was chairman of this committee.

The questions submitted in this questionnaire were as follows:

(1) Considered from the standpoint of safety to life, is weatherproof line wire safer than bare wire for general distribution on voltages over 750?

(2) If so, at what voltage is a covering of no value?

(3) Is weatherproof wire any advantage from

an operating standpoint, as regards crosses, grounds, or freedom from foreign wire troubles?

(4) Are you in favor of it being abolished entirely for line work for voltages over 750?

As "safety to life" and "continuity of service" are possibly the two most important factors from a practical man's standpoint, the question, it will be noticed, covered these points only.

In all, 128 inquiries were sent out and a total of 65 answers received. The replies have been tabulated as follows: From Hydro municipalities, 45; from other municipalities, 9; other public service corporations, 11.

(1) In favor of weatherproof insulation from safety of life standpoint: Hydro, 39; municipal, 5; company, 11; total, 55, out of 65.

Not in favor of weatherproof: Hydro, 6; municipal, 4; total, 10, out of 65.

(2) Voltage limit for weatherproof: 750 volts, 7: 1100 volt, 3; 2200 volt, 21; 4400 volt, 17; total 48.

(3) Advantage of weatherproof from operating standpoint is covered by question No. 1.

(4) In favor of abolishing weatherproof for voltages over 750: 10.

It will be noticed that of the eleven companies that have reported, none are in favor of the bare.

CONSIDERATIONS INVOLVING EQUIPMENT FOR ELECTRIC FURNACE LOADS.

Wide Range of Current Necessitates Choice of Apparatus Accordingly.

By M. A. Montague.

The usual characteristics of the electric furnace load are such that the current fluctuates between about half rated load as a minimum and 250% of full load as a maximum. This latter occurs as swings and is rarely sustained for any length of time. It is important that the above-mentioned current fluctuations be borne in mind when deciding upon the cross section and layout of conductors and the capacity behind the furnace, otherwise rate of melting may be cut down because of poor voltage regulation and high line loss, the former due to both copper loss and induction.

The choice of instruments is also influenced by the wide current variations that usually occur. Instruments should be so chosen that their range will not be exceeded during the heavy current swings on the one hand, nor yet operate too low on the scale during normal operation. Sensitive instruments are not ordinarily required for electric furnace installations. Sensitive instruments are more subject to damage due to short circuits than the less sensitive instruments, and are more likely to become deranged due to their smaller air-gap by dirt such as abounds around foundries.

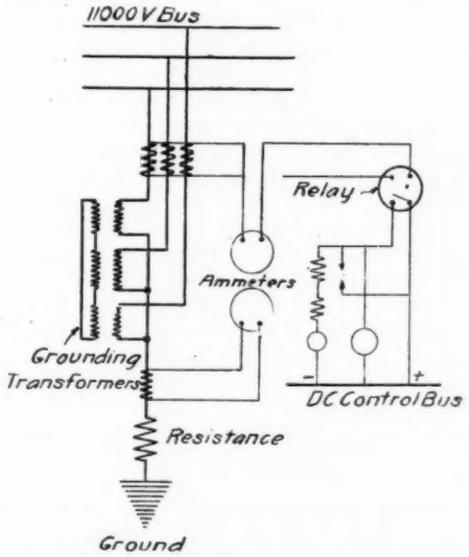
In choosing an integrating wattmeter for electric furnace loads, one having full-load capacity equivalent to about 125% furnace rating will be found to give an accurate load record and answer the purpose best. If maximum demand meters are to be employed for giving indications of what an electric furnace is actually doing in the way of demand upon the utility's circuits, a fifteen-minute period has been found to be satisfactory. For this service a graphic meter is recommended. Special provision should be made that all instruments located in close proximity to the furnace are well protected against dust entering the case.

DELTA-CONNECTED TRANSFORMERS TO BY-PASS THIRD HARMONIC NEUTRAL CURRENT.

Interesting Connection of Transformers Used by Duquesne Light Co.

The Duquesne Light Co. of comparatively recent date adopted the practice of grounding the neutral of its high-tension transmission system. As this company's system operates at 60 cycles, it was advisable to take steps to reduce as much as possible, if not prevent entirely the flow of the triple-frequency current, or third harmonic in the neurtal, as this current would create havoc with telephone and telegraph circuits in proximity.

The elimination of the third harmonic from the neutral or ground circuit was performed in a very simple manner with standard apparatus, as shown in the accompanying illustration. Instead of directly grounding the neutral of the star-connected generator bus, a grounding bank of transformers is used, these being connected to the generator neutral bus at the Brunots Island generating station. These transformers are connected in star on the bus side, the neutral or middle point of the star connection being connected



Connections by Which Third Harmonic Is Eliminated.

through a bank of resistance grids to earth. The secondary windings of these transformers are connected in closed delta, which acts as a short circuit for the free circulation of the triple-frequency current, thus eliminating it from the earth circuit and preventing inductive interference with neighboring telephone and telegraph circuits. The resistance value adopted is such as to limit the current rush to earth during times of trouble to such limit as will enable the relays to function yet without being excessive.

It will be seen from the sketch that two ammeters are installed to measure the current that passes to earth through the grounded neutral connection. The current transformers operating these ammeters have different ratios so that the one ammeter indicates 500 amperes for full scale deflection, the other 200 amperes full scale deflection, the former indicating heavy grounds such as occur during breakdowns, etc., while the latter indicates light grounds. The resistance inserted in the neutral limits the neutral current to 500 amperes.

Contracting-Construction

Valuable Suggestions for Contractors — Interesting House Organ — Powerful Screw Driver — Proposed Legislation

SELLING ELECTRIC SERVICE RATHER THAN A WIRING JOB.

Recent Paper by R. A. Gordon Contains Valuable Suggestions for Contractors and Dealers.

In a paper read at the recent convention of the Michigan Section of the National Electric Light Association, R. A. Gordon of the Houghton County Electric Light Co. submitted several valuable suggestions for subjects of co-operative effort between central stations and contractor-dealers. These suggestions are especially worthy of consideration by electrical contractors and dealers for they point out the ways in which they can assist in improving conditions in the industry, rendering better service to the public and at the same time increase their own profits.

These suggestions are as follows:

"1. The contractor-dealer should cease selling a wiring job and sell electric service.—Central stations have spent millions of dollars to create a demand for electric service by educating the public to an appreciation of the fact that electric lighting is better than any other form of lighting, and that electric service is sure, safe and economical. The general public is fast realizing these truths, and when they go to the contractor-dealer for an estimate on wiring their homes, stores and factories for electric service, they are not thinking in terms of wire, knobs and tubes, but in terms of convenience and comfort. It is, therefore, the duty as well as the opportunity of the contractor-dealer to sell the customer not a wiring job, but an electrical service, which combines utility with safety, convenience and comfort. This kind of service demands that the contractor-dealer sell to the customer the convenience of better meter locations, additional baseboard and sidewall outlets, the comforts of numerous switches properly located, and the economy of additional capacity of the wiring at the time of the original installation to take care of future requirements of electric cooking and heating appliances.

"2. Quality electrical work will enable a customer to enjoy his service long after its cost is forgotten.—Such quality electrical service as suggested above will make a permanent and satisfied customer of the average consumer of electric service to the mutual benefit of the central station and contractor-dealer.

"3. Do not wait for the manufacturer—Standardize on uniform plugs and receptacles in your own community.—The many advantages of uniform plugs and receptacles are so apparent that it is hard to understand why the manufacturers and jobbers have not been able to come to an understanding on this important subject. This deplorable condition can easily be worked out in each individual community if the different interests will co-operate to that end.

"4. Contractor-dealers should make up a merchandising schedule and co-ordinate their advertising.—Electrical supplies and appliances are fortunately not seasonable merchandise. However, it goes without question that the public naturally buys fans in the summer and heating pads in the winter. If the central station and contractor-dealer would make up a merchandising schedule and co-ordinate their advertising, they could soon educate the public to the many uses of the fan in winter, and of the many applications of the electric heating pad as an all-the-year-around appliance. The two appliances in question are perhaps the best examples of those which hitherto were considered seasonable, yet are now gradually being recognized as articles useful throughout the year.

"5. Adopt a uniform 'Cost to Operate' schedule.—Every central station commercial man knows what a task it is to satisfactorily adjust a customer's complaint of a high bill when he finds the cost of such high bill was the use of an electric heater, which the customer was told when purchasing, would use only about one-third or one-half the amount of current it would actually use. Two different dealers could give to the same customer a different 'Cost to Operate' charge and both be correct, because one might base his figures on the maximum use of such appliance, and the other base his figure on the average use. A uniform 'Cost to Operate Schedule' based on fair averages and adopted by all would eliminate many complaints of excessive bills for current and result in more sales of electric appliances by all.

"6. Co-operate to the end that electric service will be recognized as the most valuable commodity in the community.—Proper co-operation on the part of the central station and the contractor-dealer will make it possible for them to make electric service the most universally liked and most valuable commodity in their community.

NEW YORK CONTRACTOR DISTRIBUTES INTERESTING HOUSE ORGAN.

Monthly Pamphlet, "Cut-Outs," Being Published by Wm. J. Shore.

A very clever and interesting pamphlet is being distributed monthly by Wm. J. Shore, an electrical contractor-dealer and engineer, located at 1123 Broadway, New York City. It is entitled "Cut-Outs" and its purpose is to help business men electrify their business.

A radical departure from the usual run of such publications like this consists chiefly of pointed business paragraphs and humorous short sayings, many of which are original and the remainder chosen to fit a purpose from noted authorities. These add greatly to the interest of the pamphlet and it is almost impossible when once one starts to read it, not to continue to the end. And all through it there runs the idea that electric service is the best for all business and Shore is the man to do it.

A few of the more pertinent paragraphs of the last issue follow:

"It was in 1752 that Ben Franklin first demon-

strated that lightning and electricity were one and the same. And yet there are still manufacturers who don't know what electricity will do for *their* business.

"The man who waits for prices to drop may not be able to get his work done at *any price*. Better have me in *now*—tennyrate, let's talk it over. Consultation sans obligation.

"Are you going to keep pace with times or be pinched for blocking business traffic? Do it electrically. Install motors, replace old, shop-worn power equipment, improve, repair, rebuild, if necessary, but Do It Now. Shore Service really SERVES.

"When a competitor damns you put him on your payroll."

PROPOSED LEGISLATION THAT AFFECTS CONSTRUCTION WORK.

Attention of Construction Industry Called to Bills Now Pending in Congress.

The National Federation of Construction Industries, Drexel building, Philadelphia, an organization composed of building material manufacturers and others interested in construction work, is sending out a letter to its members calling attention to proposed Federal Legislation covering matters of vital interest to the construction industry as a whole. Among these matters are two bills now pending in Congress that are especially worthy of support by the electrical contracting fraternity.

The first of these bills, S. 1469, H. R. 5514 and H. R. 7597 is designed to aid in financing the construction of homes. The second, H. R. 7014, is designed to establish in the Department of Labor a Bureau of Housing. The association in its letter approves both of these bills and urges their passage, modified as may seem desirable, as a valuable aid to the construction of homes throughout the country, and as an agency in the development of thrift on the part of house owners and better housing conditions.

ST. JOSEPH, MO., ELECTRIC PLANT TO BE ENLARGED.

W. J. Squire, proprietor of the Squire Electric Co., Kansas City, Mo., has received the engineering contract, and is preparing plans and specifications for the municipal plant improvements at St. Joseph, Mo., to be made under a bond issue of $500,000. The improvements include remodeling of building, installation of new machinery, the revision of the street lighting system throughout, and some commercial and power lighting incidentals. The new plan will probably have two 3000-kv-a. turbines and three 500-hp. watertube boilers. The new plant will be equipped with stokers, economizers, and other up-to-date items.

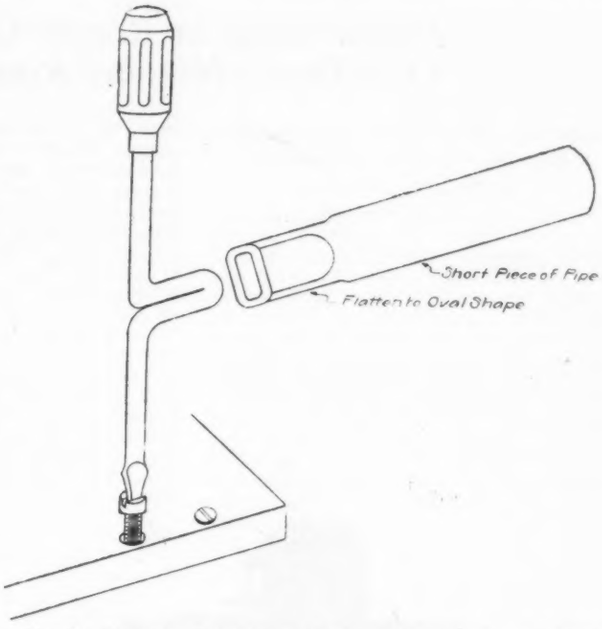
The street lighting system will be equipped with tungsten lamps and there will be probably 300 ornamental lamp posts. The rest of the lighting will be suspended over street corners.

A POWERFUL HOMEMADE SCREW DRIVER.

By Charles H. Willey.

The electrician or plant maintenance man in his daily work is often required to remove screws from machine and motors parts that are stuck or rusted in place so tightly that they cannot be removed with an ordinary screw driver. In order to remove such screws the writer uses the handy homemade device shown in the accompanying sketch.

In making this device the blade of a long bladed screw driver is heated and bent into a crank shape as



A Handy Method of Applying Extra Power to an Ordinary Screw Driver.

shown. A short piece of pipe is then flattened at one end into an oval shape that will fit over the bent part of blade. By using this pipe as a lever a very powerful force can be applied to the screw driver that will suffice to loosen all ordinary screws. A monkey wrench can be used instead of the pipe if desirable and the same results will be obtained.

REVISED RULES FOR GENERATING AND SUBSTATIONS.

The Bureau of Standards, Washington, D. C., is getting out in tentative form the changes proposed for Part 1 of the National Electrical Safety Code which covers rules for the installation and maintenance of electrical supply stations and equipment. These changes are not radical in character but are intended to cover points which were omitted in the previous editions of the Code or which seemed to need clarification.

The principal changes suggested as well as the entire scope of the new rules will be discussed more fully in an early issue.

OKLAHOMA CITY SETS NEW RECORD IN BUILDING HOMES.

During a period of 80 days recently the residents of Oklahoma City, Okla., took out building permits for more than $2,000,000 in new residences. This is the result of "build your own home" campaign, which has been in progress for several months. More homes have been built in Oklahoma City during the campaigns than in any other similar campaign for the same period of time. All the local electrical interests co-operated in this campaign and were in a large measure responsible for its great success.

New Appliances

Improvements in Remote-Control Oil Switches — Willys Light Plant—New Bell Ringers—Compartment Condenser

Developments in Oil Switches for Remote Control of Outdoor Lighting Circuits.

Control of outdoor lighting circuits can be effected by switching at the power house when the circuits extend thereto, but in case they do not it has until a few years ago been necessary to send out a patrolman or lineman to turn on or off the switch of the circuit desired wherever it might be; an alternative was to install a time switch at this place, but the latter required attention periodically and was somewhat costly in the outdoor type. To meet the evident need for power-house control of distant circuits there was developed a line of oil switches known as the R. C. O. C. type that was described in our columns some three years ago. These switches were the product of the South Bend Current Control Co., South Bend, Ind.

In the intervening years this line of switches has been further developed along lines based on the experience gained in large numbers of installations, the result being improvements in the construction of the switches, new combined types thereof and many additional uses to which they have been found well adapted. All of the switches have contacts breaking under oil of high dielectric properties and all are inclosed in iron cases closely resembling the standard distributing transformer.

Fig. 1 shows one of the improved pole type switches with case partly broken away to show the mechanism. The latter is carried by a frame of carefully kiln-dried maple that is boiled in oil, thus giving high mechanical and insulating strength. Each switch is tested to 10,000 volts, or several times normal voltage. All switches are solenoid-operated, the solenoid being energized over any convenient circuit already installed. Fig. 2 shows a typical subway or manhole type switch. Both subway and pole type switches are made in the two-in-one special type where it is necessary to conserve either space or weight.

Seven types of the R. C. O. C. switches are now made: Form AN is for all-night lamps where these are to run for the same hours as the solenoid control circuit. Form MN is especially for lamps operated until midnight and is controlled by a special locking device shown in Fig 3 which alternately opens and closes at the will of the power-house operator, who has merely to "wink" the control circuit. Form MNS is a modification of the MN especially adapted for cutting off part of a series circuit at midnight or other hour differing from the main series circuit. There are three forms of two-in-one switches, one comprising two AN switches, another two MN switches, and a third an AN and an MN switch; these are used only for 440 volts or less. Finally there is a special line of double-throw switches built to particular specifications. Fig. 3 shows not only the special locking device above referred to, but also the fluctuation compensator consisting of two strong springs that allow a considerable vertical movement of the U-shaped floating solenoid armature without opening the contacts of the controlled or load circuit; this takes care of 60% fluctuation in the solenoid control circuit without affecting the load controlled.

Fig. 1.—Pole Type R. C. O. C. Switch with Case Partly Broken to Show Interior.

Fig. 2.—Subway Type R. C. O. C. Switch.

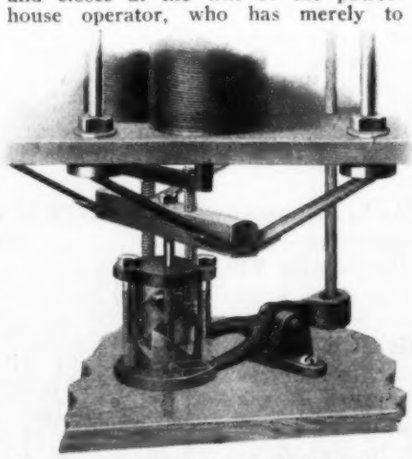


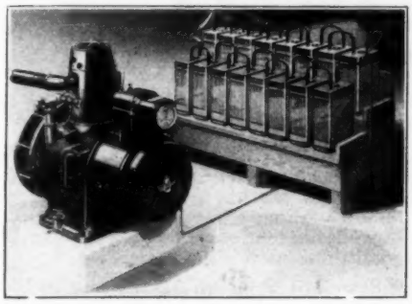
Fig. 3.—Contact Mechanism With Fluctuation Compensator and Special Locking Device.

These switches and switch combinations make possible solving a large number of control problems on both series and multiple circuits remotely located, and involving all-night or short operation of lamps; motor circuits and other power, lighting or heating circuits may also be controlled successfully at a distance. Diagrams have been worked out for some 60 different control problems that can now be successfully handled by the R. C. O. C. system.

Specifications of Willys Light Plant.

In our issue of July 19, 1919, we published a general description of the new self-contained electric light plant recently placed on the market by the Willys Light Division of the Electric Auto-

Lite Corporation, Toledo, Ohio. It has the backing of John N. Willys of automobile fame and is known as the "Willys Light" plant. We have now secured a photograph of the new outfit, which we reproduce herewith, and a



The Willys Light and Power Plant.

condensed set of its specifications, from which the following facts are of special interest.

The rating of the plant in 20-watt lamp equivalents operating for 8 hours intermittently is 83 lamps when both generator and battery are carrying the load, and 45 lamps when the battery alone is supplying the service. The battery is of the lead type, of Exide or U. S. L. make, and contains 16 cells. A 2-hp. Willys-Knight engine is used that can burn either gasoline, kerosene, distillate or gas; it is started electrically by the generator acting as a motor fed from the battery. The drive to the generator is direct and the generator is a 32-volt shunt machine of ¾ kw. rating. Control of the whole set is semi-automatic.

New Line of Bell-Ringing Transformers.

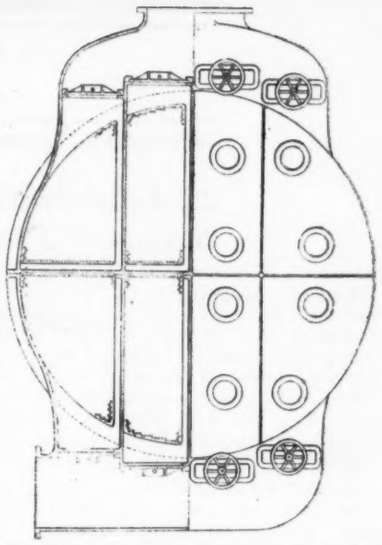
Bell-ringing transformers are coming into extensive use because of their many advantages over wet or dry cells or storage cells for ordinary signaling circuits. This accounts for the increasing demand and for the development of new types to meet it. Among these is an entirely new line just placed on the market by the Standard Transformer Co., of Warren, Ohio. This company was recently incorporated and has already taken over the bell-ringing transformer business of the Packard Electric Co., of Warren, to which it is adding its own designs to cover various requirements.

Its entire line is clad in blue-glazed porcelain cases. It offers the residence type of 15-watt capacity for operating the front, rear and table bells and for other signal service found in any home. This type is made for 100-230 volts and for 25, 40, 50 and 60-cycle circuits. The bell side of the transformer has 11 volts on open circuit or under no-load conditions and is inductively wound so that a short circuit on the low-voltage side maintained indefinitely will not destroy the transformer. This type is approved by the Underwriters' Laboratories, Inc., and listed as a National Electrical Code standard. The heavy-duty types for apartments, school houses, factories are 50-watt capacity with 6-12 and 18 volts on the bell side. This lends a flexibility to this type for operating both short and long bell circuits from the same instrument. This condition is frequently met in this class of service, but never on residence bell circuits. Formerly, this type was made with a cast iron case which has now been replaced with a blue glazed porcelain cover. The company claims the porcelain clad types have advantages over the iron box or metal case types as the porcelain will not rust or corrode, is an excellent insulator, non-resilient, hence muffles the hum or buzz inherent to alternating current devices, and as applied to its transformer is pleasing in appearance, light in weight and mechanically rugged. The cores on both the residence and heavy-duty sizes are made of silicon-alloy steel, the coils are thoroughly impregnated and the cases are compound filled which makes the transformers weatherproof, hence are not injured by being installed in a damp basement or other places where they may be exposed to moisture.

Compartment Condenser Permits Cleaning in Service.

A new and valuable development in steam surface condensers is announced by the Wheeler Condenser & Engrg. Co., Carteret, N. J. It is a patented "compartment condenser" that can be cleaned while in service without shutting down the turbine.

This is a timely development in view of the persistent claims made by well known fuel authorities that the price of fuel is not likely to go down for some time if at all. This condenser will enable the chief engineer to constantly maintain clean condensers, hence a constantly high vacuum. All engineers of experience know that in addition to increasing output a high vacuum means low fuel consumption and a considerable saving in money year in and year out.



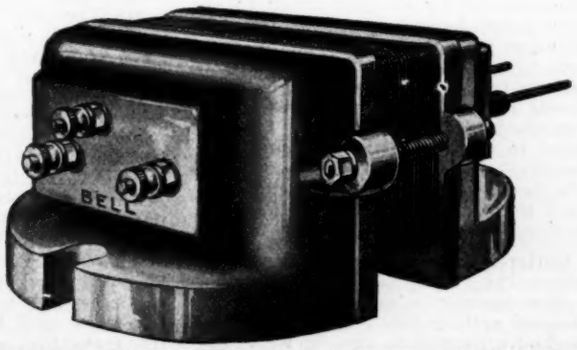
New Type of Wheeler Surface Condenser That Permits of Sectionalization for Cleaning Purposes.

Also upon installation of this condenser there need be no interference with the operation of the turbine. At the present time, in many important power stations, even where water conditions are regarded as good, it is necessary to occasionally shut down the turbine for a period sufficiently long to clean the condenser.

To clean the average condenser is not a difficult task, but it is time-consuming, and for that reason the engineer is tempted to put cleaning off.

The illustration shows clearly how the compartments are arranged. The condenser shown is divided into four compartments, each compartment being equipped with a set of valves to control the circulating water. To clean the condenser while the turbine is delivering full power, the operator simply shuts off the water from one compartment, removes the cover, cleans the tubes, replaces the cover, turns on the water again, and then passes on to the next compartment repeating the operation until the four compartments of the entire condenser are clean. Thus, while one compartment is being cleaned, the other compartments are in full operation, temporarily taking over the entire turbine load.

Household Size of Standard Bell Ringer, Showing Compactness and Light Weight.



Heavy-Duty Type Bell-Ringing Transformer with Three Secondary Voltages.

Trade Activities

E. C. Atkins & Co. to Be Represented in Australia — Standard Transformer Incorporates — Special Literature

Sullivan Machinery Co. announces the appointment of R. S. Weiner as district manager of El Paso, Tex., succeeding Don M. Sutor. Mr. Sutor has been transferred to the St. Louis office of the company as district manager for Missouri, eastern Texas, Oklahoma, Kansas, western Kentucky and western Tennessee.

Celite Products Co., New York City, has appointed Charles P. Derleth to represent its interests in order that the increasing demands for Celite products (Sil-O-Cel for heat insulation and Filter-Cel for filtration) may be properly cared for. Previous to his enlistment 14 months ago in the Chemical Warfare Service, Mr. Derleth was affiliated with the J. B. Ford Co., Wyandotte, Mich., as sales representative. He is a graduate of the University of Illinois.

The American Steam Conveyor Corp., Chicago, announces the appointment of Morton McI. Dukehart & Co., as its representative in Baltimore, and the surrounding territory, which includes all of Maryland, and the District of Columbia, and a few counties in Pennsylvania, Delaware, West Virginia and Virginia. This concern consists of Mr. Dukehart, and E. S. Denise—both power plant engineers of long standing, and sales engineers of considerable ability. They have an enviable reputation and their service undoubtedly will considerably strengthen the sales force of the American Steam Conveyor Corp.

The Bleadon-Dun Co., Chicago, has issued a book of 52 pages dealing with violet rays as applied with the Violetta. The book first reviews the development of electricity as a curative agent and the discovery of the violet ray machine, or as it is known technically, the high frequency generator by Nikola Tesla, and also presents the phenomena produced by violet rays. This high frequency generator is generally recognized as one of the most amazing developments of electricity and many startling results have been secured by its application to almost every known ailment. The application of violet rays with the Violetta to many ailments is depicted and various types of Violetta outfits, electrodes and supplies are illustrated and described. Some ten pages are devoted to testimonial letters from sanitariums, physicians, beauty specialists, home users, and others who have used this device with complete satisfaction.

Cutler-Hammer Manufacturing Co., Milwaukee, Wis., has recently issued a new descriptive leaflet on the C-H hospital call switch, which shows the method of installing this device in the wall adjacent to the patient's bed. The switch is made for use on silent call and other systems such as used in the modern hospitals. Another of the new leaflets illustrates the Cutler-Hammer 7720 duplex receptacle, which provides two outlets in the space required for one. The principal illustration on this leaflet shows a typical ironing scene with the iron cord attached to one outlet, while an electric fan is connected to the other. The small blueprint which accompanies the duplex receptacle leaflet indicates the location of a number of duplex receptacles in the floor plan of a typical modern home and suggests the many electrical appliances which may be used when sufficient convenient outlet receptacles are provided.

E. C. Atkins & Co., Indianapolis, Ind., manufacturer of Atkins silver steel saws, which in the last three years have enjoyed a steady growth in Australia amounting to over 50%, have appointed James N. Mackin to represent their interests in that country. He is superintendent of the Australian division and has established headquarters at 5 Australasia Chambers, Martin Place, Sydney, N. S. W., Australia. During the war Mr. Mackin represented the Atkins company at Washington, D. C., and made hosts of friends both for himself and for this firm. His thorough knowledge of every detail concerning saws, as well as his wide experience in selling and his pleasing personality, make him popular with everyone who is in the least acquainted with the Atkins service. Before becoming associated with the Atkins company, Mr. Mackin traveled extensively throughout the world, becoming thoroughly conversant with business conditions in foreign lands.

James N. Mackin.

Standard Transformer Co., Warren, Ohio, has been incorporated under the state laws of Ohio for the purpose of manufacturing a complete line of bell ringing transformers. It has consummated an agreement with the Packard Electric Co., of Warren, Ohio, whereby it will in the future manufacture the bell transformers placed on the market by the Packard company about six years ago. These transformers, which embody new improvements in construction, are described in detail in another section of this issue.

Diamond Power Specialty Co. literature has always been distinguished by its direct appeal to the engineering knowledge and sound business judgment of its readers. This is particularly true of bulletin No. 132, "Profits that Get Away Through Your Boiler Room," just issued by the company. This bulletin, which is an attractive, well written book of 24 pages, deals first with the importance of exercising business-like supervision over the boiler room; the effect of soot on boiler efficiency; and in its concluding pages describes Diamond soot blowers for horizontal return tubular boilers. The book is well illustrated with charts, graphs and ledger sheets showing actual improvements affected, and should be in the hands of every operator of horizontal return tubular boilers. Copies may be had on application to the Detroit office of the company.

South Bend Current Control Co., South Bend, Ind., has issued an engineers' reference book on the R. C. O. C. system of remote control. This book gives not only a description of the company's oil switches for remote control of lighting and other circuits, by means of any convenient circuit that is used as a control circuit operated from the power house, but also gives the results of several years of experience in solving the problems of remote control that distribution engineers are confronted with in operating outdoor lighting and similar systems. This is shown in 17 of some 60 circuit diagrams, showing various problems that formerly were inclined to be impossible of solution. These circuits are shown by means of large blueprint diagrams. A list is given of a very large number of users of these switches as well as typical letters from such users and a number of installation views of the switches in use and of lighting circuits controlled thereby.

Current News

Weekly Record of Construction Activities—Conventions

EASTERN STATES.

Laconia, N. H.—Scott & Williams have commenced the erection of a new boiler plant at their works to cost about $20,000. Lockwood, Greene & Co., 60 Federal street, Boston, Mass., are engineers.

Portsmouth, N. H.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans the installation of a 1000-kw. turbogenerator at the local navy yard to cost about $17,000. (Specification 4017).

Cambridge, Mass.—Electrical and mechanical equipment will be installed in the new seven-story and basement cold storage plant to be erected by John P. Squire & Co., 165 Gore street, The structure is estimated to cost about $200,000.

Southwick, Mass.—An election will soon be held to vote on $15,000 for the establishment of an electric plant to furnish electricity for lighting, power and heat.

Worcester, Mass.—In connection with the erection of an addition to their plant for increased output, James Smith & Sons, 99 Hope street, will build a new boiler plant for factory operation.

Worcester, Mass.—American Steel & Wire Co. will erect a building, 24x 440 ft. at the North Works, and will install new electric galvanizing equipment.

Hartford, Conn.—Hartford Electric Co. is having plans prepared by Stone & Webster, Boston, Mass., for its proposed electric generating plant in the Colt Meadows district. The plant will have an initial capacity of about 100,000 kw.; it will be designed for oil fuel operation. The company is now operating a plant at Dutch Point.

Middletown, Conn.—In connection with a new factory addition for increased capacity, the Russell Manufacturing Co., manufacturer of webbing, etc., will build a complete new power plant for works operation. The plant will include turbine department, engine room, pumping chamber and boiler plant.

Binghamton, N. Y.—Binghamton Light, Heat & Power Co. has commenced the installation of a new 2500-kw. generator at its power plant, with auxiliary operating apparatus. The company has commenced the construction of a new power line to the shoe manufacturing plant of the Endicott-Johnson Corp., Endicott, N. Y. A load of about 1500 to 2000 kw. will be carried at the plant, in addition to the present power supply. The new lines will be tied in with the system running to the company's plant at Johnson City, allowing for an interchange of service as desired.

Buffalo, N. Y.—Donner-Union Coke Corp., Abbott Road, has filed plans for the erection of a new electric substation at its plant to cost about $11,-400. The company will also build a number of other structures in which mechanical and electrical equipment will be used to cost about $85,000.

Canandaigua, N. Y.—Lisk Manufacturing Co. is having plans prepared for the construction of a one-story plant, 63x87 ft., to be used for works operation.

New York, N. Y.—Transit Construction Commissioner John H. Delaney has received and opened bids for the construction of tracks in the section of the Culver Rapid Transit Railroad extending along Shell road and West 6th street from Avenue X to Sheepshead Bay road, Coney Island, N. Y. The lowest bid was that of the Slattery Engineering & Contracting Co., at $58,513.70. It is expected that an award will be made in the near future. The time for completion is four months.

New York, N. Y.—Long Island Electric Railway is arranging to institute proceedings for a dissolution of the corporation, and the appointment of a receiver. The company operates a system from Grant street, Brooklyn, to Belmont Park, and in the Jamaica and Far Rockaway sections. It was organized about 25 years ago, and has a capitalization of $600,000. W. O. Wood is vice-president and general manager.

Oswego, N. Y.—The water service commission will establish a new municipal light plant. Address town clerk.

Rochester, N. Y.—North East Electric Co., 348 Whitney street, manufacturer of electrical specialties, has awarded a contract to C. W. Hoffman, 120 Railroad street, for the erection of its proposed two-story plant, 86x198 ft., on Lyell avenue, to cost about $60,000.

Rochester, N. Y.—The Municipal hospital is having plans prepared for the construction of a new boiler plant at the institution. The Board of Contract and Supply is in charge of the work. Gordon & Kaelber, Sibley building, are architects.

Syracuse, N. Y. — Considerable electrical and mechanical equipment will be installed in the new five-story cold storage plant to be erected by the Merrell-Soule Co. The structure will be 61x90 ft., and is estimated to cost $90,000. The Turner Construction Co., 241 Madison avenue, New York, has the building contract.

Bloomfield, N. J.—Sprague Electric Works of the General Electric Co., have awarded a contract to Salmond Brothers, 568 Elm street, Arlington, N. J., for the erection of an addition to its plant on Lawrence street to cost about $15,000.

Bloomingdale, N. J.—The Borough Council has authorized the installation of new arc lights on the Carmonton Road. The service will be furnished by the municipal electric plant at Butler.

Newark, N. J.—New York Telephone Co., 15 Dey street, New York, is planning for a total expenditure of about $3,270,000 for line improvements and extensions in the Northern New Jersey district during the present year. Edmund W. Wollmuth is district manager.

Newark, N. J.—Lux Manufacturing Co., 121-33 East Kinney street, manufacturer of high-grade tungsten lamps, has arranged for a stock issue of $100,000 for proposed expansion. The company has acquired property adjoining its works and plans for the construction of an addition for increased capacity at a later date. A. T. Baldwin is treasurer.

Newark, N. J.—Economic Electric Co. has filed notice of organization to operate a works at 232 West Kinney street, for the manufacture of electrical supplies. Isidor Eglowstein, 140 West Kinney street, heads the company.

Newark, N. J.—A large power plant for works operation will be erected by the Cocoanut Oil Co., in connection with the construction of its new plant at Passaic avenue, near Chapel street. The entire project is estimated to cost about $300,000. John Lowry, Jr., 8 West 40th street, New York, has the building contract.

Newark, N. J.—Stengle & Rothchild, Main street, have awarded a building contract to the Becker Construction Co., 361 Grove street, for the construction of the proposed new one-story boiler plant at their leather works to cost about $16,000.

Newark, N. J.—Rainbow Electric Co. has filed notice of organization to operate a plant for electrical work at 258 Chadwick avenue. Samuel Rubinstein heads the company.

Phillipsburg, N. J.—Electrical and mechanical equipment will be installed in the proposed sewerage disposal plant to be constructed by the city officials. The plant will be of three unit size, each unit with capacity of 1,000,000 gallons, and is estimated to cost $125,000. City Engineer Tilton will prepare plans and specifications.

Beaver Falls, Pa.—Electric Service Co., manufacturer of electrical equipment, and operating a local repair works, has commenced the removal of its plant to 700 Third avenue, to provide for increased capacity. C. J. Freund is president.

Allentown, Pa.—Electric Bond & Share Co., 71 Broadway, New York, has inaugurated construction work on new transmission lines and power plant extensions in the Lehigh Valley section to cost about $500,000.

Bethlehem, Pa.—A one-story power plant for works operation will be erected by the Traveler Tire & Rubber Co., 819 North Broad street, Philadelphia, in connection with its new manufacturing plant at Traveler avenue and Auburn street, Bethlehem. The entire works will cost about $125,000. J. Osborne Hunt, 114 North Montgomery street, Trenton, N. J., is architect.

Chester, Pa.—A large power plant will be erected by the Chester Hospital in connection with the construction of a new surgical pavilion at the institution. The project is estimated to cost about $250,000.

Easton, Pa.—Pennsylvania Utilities Co. is planning for the immediate installation of three new boilers at its Dock street plant, to increase the present capacity.

Emaus, Pa.—The contract with the Lehigh Valley Light & Power Co., for street lighting and local power service expires on April 1, 1920, and during the remaining period, the Borough Council will investigate the possibilities of the operation of a municipal electric power plant in conjunction with the present city owned waterworks. The present service charges for lighting for the municipality aggregate about $4200.

Harrisburg, Pa.—Public Service Commission has inaugurated work on its proposed investigation of the existing telephone rates throughout the state. The financial condition and cost of operation of the Bell Telephone system will be ascertained. The company is continuing the increase in rates as arranged under Government control pending the outcome of the investigation, allowed for a period of four months by the commission.

Northumberland, Pa.—Northumberland County Gas & Electric Co. has filed notice with the Public Service Commission for an increase in light and power rates, effective Sept. 15.

Philadelphia, Pa.—A boiler plant for works service will be erected by the A. Schoenhut Co., Amber and Venango streets, in connection with the construction of an addition to its woodworking plant to cost about $44,000.

Philadelphia, Pa.—Wirt Co., Armat and Lena streets, manufacturer of electrical products, has filed plans for the erection of a new two-story plant, 62x158 ft., at Greene street and Queen Lane, to cost about $60,000. Charles Wirt is president.

Baltimore, Md.—Chesapeake & Potomac Telephone Co. has made application to the city for permission to install a new underground conduit system under the Harford Road, from a point near Montebello Terrace to its Hamilton Exchange.

Crownsville, Md. — Crownsville State Hospital is having plans prepared for the erection of a new power plant at the institution, with initial capacity of about 6000 hp. C. L. Reeder, Park avenue and Saratoga street, Baltimore, is construction engineer.

Warren, Md.—Warren Manufacturing Co. has under consideration the building of a new power plant in connection with the proposed addition to its work, which is estimated to cost about $250,000. The cost of the power plant is to be $35,000.

Elkton, Va.—The Janney & Burroughs tannery which supplied electric light was destroyed by fire.

Clarksburg, W. Va.—Baltimore & Ohio Railroad is said to be planning for the electrification of its lines in the vicinity of Keyser in Mineral county. The road has a 17-mile grade in this section, and proposes to haul freight trains over the grade under motor operation.

New Cumberland, W. Va.—West Virginia-Pittsburgh Coal Co., Pittsburgh, Pa., is planning for the erection of a new electric power plant at its LaBelle mine. With extensions of rail system at the properties, the plant is estimated to cost about $100,000.

Wellsburg, W. Va. — Wellsburg Electric Light Co. is planning for the erection of a new local two-story electric substation. J. S. Jenks is vice-president.

Riversville, W. Va.—Monongahela Valley Traction Co. is in the market and will purchase and install immediately two more 10,000-kw. turbines which will double the present capacity and assure plenty of power, for the next few years. Address E. B. Moore, general manager, Fairmont, W. Va.

Sumter, S. C.—City Council is planning for extensions and improvements in the municipal electric lighting plant to cost about $90,000. The work will include the installation of a new 1000-kw. turbogenerator, surface condenser, with new water-tube boiler, boiler-feed pumps and other operating equipment.

Arlington, Ga. — Baker County Power Co. is planning for a new hydroelectric power plant on a site in Baker county, to cost with electric transmission system about $640,000. W. E. Saunders is president.

Pensacola, Fla.—A series of about 20 electrically operated centrifugal pumps will be installed by the Bruce Dry Dock Co., in connection with its proposed dry dock and ship repair plant. The plant is estimated to cost $450,000. Address secretary of Bruce Dock Co.

Perry, Fla.—Perry & Gulf Coast Traction Co. will build a railway between Perry and Warrior Beach, distance of 15 miles. Ellis Bartholomew, Palm Grove, Fla.

West Palm Beach, Fla.—Bell Telephone & Telegraph Co., has purchased the system of the West Palm Beach Telephone Co., and will rebuild at a cost of about $200,000.

DATES AHEAD.

Pennsylvania Electric Association. Annual convention, Bedford Springs, Pa., Sept. 3-6. Secretary, H. M. Stine, 211 Locust street, Harrisburg.

Washington State Association of Electrical Contractors and Dealers. Annual convention, Seattle, Sept. 11. Secretary, Forrest E. Smith, 205 Boston Block, Seattle.

Association of Edison Illuminating Companies. Annual meeting, New London, Conn., Sept. 16-18. Secretary, H. T. Edgar, Stone & Webster, Boston, Mass.

Southeastern Section, N. E. L. A. Annual convention, Asheville, N. C., Sept. 17-19. Secretary-treasurer, T. W. Peters, Columbus, Ga.

Iowa State Association of Electrical Contractors and Dealers. Annual convention, Sioux City, Iowa, Sept. 22 and 23. Secretary, F. Bernick, Jr., Oskaloosa, Iowa.

New England Section, N. E. L. A. Annual convention, New London, Conn., Sept. 22-24. Headquarters, Hotel Griswold. Secretary, Miss O. A. Bursiel, Boston, Mass.

Association of Iron and Steel Electrical Engineers. Annual convention, St. Louis, Mo., Sept. 22-26. Secretary, John F. Kelly, Empire building, Pittsburgh, Pa.

American Electrochemical Society. Fall meeting, Chicago, Sept. 23-26. Headquarters, Congress Hotel. Secretary, Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa.

International Association of Municipal Electricians. Annual convention, Chicago, Sept. 23-26. Secretary, Clarence R. George, Houston, Tex.

Empire State Gas and Electric Association. Annual meeting, New York City, Oct. 9. Secretary, Charles H. B. Chapin, 29 West 38th street, New York City.

National Association of Electrical Inspectors. Annual meeting, Springfield, Mass., Oct. 13 and 14. Secretary, W. L. Smith, Concord, Mass.

Illuminating Engineering Society. Annual convention, Chicago, Ill., Oct. 20-23. General secretary, Clarence L. Law, 29 West 39th street, New York City.

Illinois State Electric Association. Annual convention, Chicago, Oct. 22 and 23. Secretary-treasurer, R. V. Prather, Springfield, Ill.

NORTH CENTRAL STATES.

Cincinnati, Ohio.—Improved street car facilities for both the new courthouse and the Central Union Railway station are to be provided. Address W. C. Culkins.

Lima, Ohio.—A new lighting system will be placed in the Central Church of Christ on West North street. Rev. J. A. Canby, pastor.

Lima, Ohio.—Ohio Steel Foundry Co. will erect an additional building, estimated cost $200,000. The plans call for the installation of a machine-charged furnace which will increase the output of the plant 15%. An overhead crane, electrically operated with a span of 100 ft. and a traveling range of 2600 ft. is to be included in the new improvements.

Fort Wayne, Ind. — Fort Wayne Builders' Supply Co. has begun the erection of a brick and stone storage house for the Rub-No-More Co., to cost $4000.

Fort Wayne, Ind.—General Electric Co. plans to increase its working force by approximately 1000 employes. During recent months business has constantly increased until now the company is deeply feeling the need of more men.

Indianapolis, Ind.—Robert H. Hassler Co. will build one-story factory, brick, steel and glass, 100x120 ft., to cost $30,000.

Indianapolis, Ind.—United States Corrugated Fiber Box Co. will erect

a new building, two stories high, 100 x160 ft., fireproof. The company will build a second story to one of the older buildings, 83x160 ft.

Muncie, Ind.—Big Four Railway Co. will erect a modern freight house to cost $30,000. The company will also build a belt line around the city of Muncie.

Warsaw, Ind.—The Indiana Public Service Commission has issued an order for the Winona Electric Light & Water Co. to construct a new pumping station and to lay new mains.

Carbondale, Ill.—Surveyors for the proposed electric railway from Davenport, Iowa, to Metropolis, Ill., are making surveys near this city. The company will make a specialty of transporting coal from the extensive coal fields of Southern Illinois.

Carbondale, Ill.—Peroxide Chemical Co., St. Louis and Chicago, will erect a $20,000 factory building, 90 x100 ft., brick, one-story, containing 9000 sq. ft. of floor space. Charles B. Gautheir, a chemical engineer with the company, will be in charge of the plant. The plan will be to manufacture chemicals used for bleaching purposes in practically every phase of the bleaching business.

Champaign, Ill.—Cushman Auto Tool Co. has purchased the plant and equipment of the D. F. Boyer Handle Co., and the Danville Handle Co., at Danville, Ill., and will operate them as branches of the Champaign plant.

Galesburg, Ill.—An ordinance for the installation of an ornamental lighting system on Chambers, Losey, Willard and Bateman streets, at an estimated cost of $20,279.29, for the pavement of Mathews street at an estimated cost of $5,972.99, was passed by the city council.

Rock Island, Ill.—Root & VanDervoort Engineering Co. will install a complete electrical dynamometer testing laboratory, under the supervision of Charles P. Grimes, development engineer. This will be the fourth laboratory of this type to be installed by Mr. Grimes. It is expected that the information made available in the new laboratory in the Root & VanDervoort Engineering Co.'s plant will enable engineers in charge of motor and automobile designing to make much progress in the development of the company's products.

Springfield, Ill. — Davenport, Springfield & Southern Railway Co. has applied to the Illinois Public Utilities Commission for a certificate of convenience and necessity to construct and operate an electric interurban railroad from Davenport, Iowa, to Metropolis. The company also plans to build a branch line from Pinckneyville, Ill., to East St. Louis, Ill., and to construct other spurs as well, such as from Pinckneyville to Coulterville; Belleville to East St. Louis; Decatur to Litchfield and Edwardsville, and Benton to Marion. The company expects to do a heavy railroad business especially, making a special business of handling coal from the Southern Illinois coal fields.

Urbana, Ill.—Board of local improvements has awarded contract for ornamental lighting system to Freeman Sweet Co., Chicago, for $5850.

Benton Harbor, Mich.—Austin & Shamblain, 731 J. M. S. building, South Bend, have prepared plans for two-story box factory for George E. Thayer. The specifications call for motors and electrical equipment.

St. Paul, Minn.—Northern States Power Co. has closed a contract with the new Union Depot for its electric light and power requirements, the connected load amounting to about 1500 kw. Steam for heating will also be furnished under this contract. When completed the depot will be one of the most modern in the United States, costing, with its accompanying yards and track rearrangement, about $11,000,000.

Albany, Wis. — Engineer W. G. Kirchoffer, Vroman Block, Madison, Wis., has prepared plans for improving the power dam.

Black River Falls, Wis.—Plans have been prepared for municipal electric light plant for city. Architects Meade & Seastone have prepared plans. Address Albert Knutson, city clerk.

Chippewa Falls, Wis. — E. S. Schneider, president of Apple River Milling Co., has planned construction of dam, power house and canal near the quarry at Colfax.

Janesville, Wis.—Architect F. D. Chase, 645 North Michigan avenue, Chicago, has prepared plans and will let contracts for $40,000 power house for the General Motor Co. Specifications include motors.

Davenport, Iowa. — First unit of new four-story factory building of the Linograph Co. has been commenced. The building will cost $105,000.

Davenport, Iowa.—Voss Manufacturing Co. will build four-story addition 50x150 ft. to its plant. It will be connected to the main factory by an overhead "L" and tunnel. The company has booked one order alone for 10 carloads of washing machines from a Pittsburgh concern.

Terrill, Iowa.—The extension and improvements of improving electric lighting is under consideration. Address town clerk.

Independence, Mo.—A special election will be held Sept. 16, to vote on the proposal to issue $65,000 in bonds to add a new unit to the municipal electric light plant.

Mountain Grove, Mo.—J. Fred Ellis, J. A. Chase and L. H. Williams, of Mountain Grove, are organizing a company for the purpose of erecting an electric light and power plant at the Double Grove Springs in Ozark county, 34 miles from Mountain Grove. A dam and power plant will be erected. Engineers have estimated that the spring can furnish 1000 hp.

Versailles, Mo. — The municipal light plant at Versailles has been bought by Henry Moser, who will overhaul the plant and add $15,000 of new equipment.

Arlington, Kans.—Election carried for electric lights, bonds for $20,000 having been voted. At the same time election was held to vote the same amount of bonds for lights at Partridge. Both towns will get their light from Hutchinson.

Bendena, Kans. — Electric lights are soon to be installed here.

Chanute, Kans.—The election to vote on the proposition of issuing $75,000 in bonds for enlargement and improvement to the electric light plant, carried.

Courtland, Kans.—A special election will be held Sept. 16 to vote on the issuing of $45,000 bonds for the installation of a modern waterworks system.

Eldorado, Kans.—The contract between the city of Eldorado and the Kansas Gas & Electric Co., has been formally signed, 100 candle power lights will be installed for all street lighting as well as the ornamental lamps for the white way.

Erie, Kans.—A new electric light plant is contemplated.

Guide Rock, Kans.—Plans are being made for an electric light system.

Hiawatha, Kans. — Transmission lines will probably be established from Hiawatha to Willis and Bendena.

Kinsley, Kans.—Plans are being made for the installation of a white way.

Larned, Kans.—Plans are being made to bring electric current from the Hutchinson power plant through high-power transmission lines.

Willis, Kans.—Plans are being made to determine the cost of a high power transmission line from Horton to Willis. As soon as the price is determined, an election will be called to vote bonds for the line.

Mulvane, Kans.—Bonds have been voted for taking over the electric light plant.

Omaha, Neb.—Union Power & Light Co. has been given authority to issue $119,000 on preferred stock.

Oshkosh, Neb.—The election for $9750 bonds for electric lighting system carried. Address town clerk.

Watertown, S. D.—Engineer Lewis C. Larson, 18 Hendon avenue, St. Paul, Minn., is preparing plans for an electric light and power plant, estimated cost $175,000. Brown Mathier, city auditor.

SOUTH CENTRAL STATES.

Louisville, Ky.—Commercial department of the Louisville Gas & Electric Co., during the week ended Aug. 9, secured 51 new electric light and power customers with 37 kw. for lighting and 603 hp. in motors, and accepted contracts for wiring 11 already built houses. New business connected to the company's lines includes 30 customers with 23 kw. of lighting. There was a temporary loss of 42 hp. in motors. Electric energy output shows a gain of 11% over the corresponding week a year ago.

Delight, Ark.—J. F. Rhyne, Delight, is planning for the erection of an electric power plant at Okolona, Ark., for local light and power service. A similar station will also be erected in the vicinity of Delight.

Fargo, Okla.—Election was held

Aug. 11 to vote $26,000 in bonds for the construction and equipment of an electric light plant and waterworks system. A. C. Brauch, city clerk.

Hobart, Okla.—Engineers C. V. Long & Co., 1300 Colcord building, have prepared plans for $135,000 electric light plant to be erected here. Address J. J. Hunt, mayor.

Hooker, Okla.—Plans are being made for a new light plant to cost $40,000.

Albany, Tex.—The Common Council is considering a bond issue of $40,000 for the erection of a municipal electric power plant and ice plant.

Brownwood, Tex.—Further extension of the high-power lines from the Texas Power & Light Co., from this point is to be made in the near future. A line will be built from Dublin to De Leon and Gorman and a line from Dublin to Stephenville.

Denton, Tex.—E. P. Turner of Dallas, and associates, are promoting the construction of an interurban electric railway between Fort Worth and Denton and between Fort Worth and Irving. Each line will be about thirty miles long. The commissioners' court of Tarrant county, of which Fort Worth is the county seat, has granted a franchise for the construction of the proposed roads across and over the county roads. It is stated by Mr. Turner that financial arrangements for the fulfilment of the project have been made. He is also at the head of the Dallas & Southwestern Interurban Railway Co., and the Dallas & Northwestern Interurban Railway Co. The former plans to construct an interurban line from Dallas to Glen Rose, and the latter from Dallas to Denton. Mr. Turner and associates also hold franchises for the construction of an interurban railway between Fort Worth and Abilene, via Mineral Wells and Brackenridge.

Mexia, Tex.—City Council is planning for the establishment of a municipal electric light and power plant to cost $100,000. Address mayor.

Ripley, Tex.—Citizens have approved a bond issue of $150,000 for the establishment of a municipal power plant, with ice manufacturing department.

Wichita Falls, Tex.—Preliminary work looking toward construction of an interurban electric railway between Wichita Falls and Dallas is making rapid progress. Men of large financial means of both Wichita Falls and Dallas are behind the project and its fulfilment is said to be assured. Two routes into Dallas have been surveyed and the selection of the one to be followed will be made soon, it is announced by Fred A. Jones of Dallas, who is in charge of the work. The line will be about 150 miles long. It will pass through a number of thriving towns and give a new transportation outlet to one of the most populous sections of Texas. Electric power stations will be built at Dallas and Wichita Falls. There will not be a crossing at grade on the line and a maximum grade of one per cent will be obtained, according to Mr. Jones.

Wichita Falls, Tex.—Within a short time practically all of the oil well and pipe line pumping plants in the Burkburnett oil field, including the Northwest extension pool, will be operated by electric power. Already the new transmission line which the Wichita Falls Electric Co. constructed from its central station here to the Burkburnett field is providing power for a number of oil well pumps. The capacity of the company's plant is being greatly enlarged by the installation of a turbine engine of 5000 hp. and other equipment. When the improvements that are now being made are finished the plant will be more than double its present capacity, it is stated. It is asserted by oil operators that the use of electric power for operating the pumping plants will lessen the cost of production considerably. Fuel is high in price and difficult to obtain, on account of the congested traffic conditions upon the railroads.

WESTERN STATES.

Phoenix, Ariz.—The Water Users' Association plans to construct a $500,000 electric power plant to furnish power to every ranch of the valley. Project manager, W. R. Elliott.

Buhl, Idaho.—R. B. King, district manager of the Idaho Power Co., announces that his company will increase the generating power of the plant at Thousand Springs from 6000 to 8000 hp.

Uncon, Idaho.—Utah Power & Light Co. is extending its distribution system to the eastern part of this town to take care of customers in that section.

Libby, Mont.—About $240,000 will be spent for the construction of a 200-ton concentrator and power plant and other buildings by the Lukens-Hazel Mining Co., Libby. A pipe line will be installed from Granite, which will develop about 500 hp.

Seattle, Wash.—A large quantity of electrical equipment will be required in connection with the construction of the proposed 18,000,000-ton dry dock at the plant of the Ames shipbuilding & Dry Dock Co., including complete electrically operated pumping apparatus, motors, etc.

Seattle, Wash.—The Board of Public Works was directed by the city council to prepare plans for the Gorge Creek plant of the Skagit River power project. Bids are to be called for as soon as the plans are ready. This action was taken by the Utilities committee after consideration of a report from the City Engineer, A. H. Dimock, showing the construction of a high dam in the vicinity of Ruby Creek.

Marshfield, Ore.—Mountain States Power Co. will supply electric energy amounting to 40 hp. for the operation of a refrigerating machine for the Coos Bay Ice & Cold Storage Co. Negotiations are under way for the electric requirements of a veneer plant recently completed and a new sawmill at Marshfield.

Silverton, Ore.—Portland-Southeastern Electric Railway was granted a franchise at the meeting of the city council for a 50 year period. Address general manager.

Pittsburgh, Cal.—Several bonding propositions are to be submitted. Among these will be the installation of an electrolier lighting system.

FOREIGN TRADE

[Addresses of firms referred to in these trade opportunities may be obtained by writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch and local co-operative offices. Request for each opportunity should be on a separate sheet and the file number given.]

Electrical Supplies (30,206).—An American firm whose South American manager is leaving shortly for Brazil and Argentina desires to secure agencies for the sale in those countries of hardware and electrical supplies. References.

Motors, Dynamos, Transformers (30,212).—A commercial agent in Belgium desires to secure an agency on commission for the sale of complete equipment for electrical illuminating motors and dynamos, alternators, 25 and 50 cycles usual, transformers, and complete equipment for transformers of electric current. Correspondence should be in French. Reference.

Copper Wire, Cable, Lamp Cord, Motors (30,366).—Catalogs, price lists, and samples of all sorts of bare and insulated copper wire, stranded cable, all sorts of lamp cord, marine motors and equipment, and automobiles and accessories, are desired by a firm in Norway. Reference.

Iron Plates for Electrical Machinery, Wire (30,361).—Iron plates for electrical machinery, asbestos, asbestos cardboard, insulating bands, tinned steel wire, oiled gauze, mica, tubular soldering or welding, string, etc., are required by a company in Belgium. Quotations should be given c. i. f. Antwerp. Correspondence may be in English. References.

Wire (30,394).—An agency is desired by a man in Italy for the sale of agricultural machinery and parts, iron and steel products, rails, tubing, electric wire railroad material (narrow gauge), coal, and writing materials. Correspondence may be in English. References.

Lighting Systems (30,395).—The director of agriculture of a Government of Europe desires to have manufacturers forward catalogs and other information relative to meteorological instruments, hydrometric instruments, leveling and surveying instruments, agricultural instruments, flour-milling machinery, dairying equipment, sanitary water-supply and sewage systems, hydraulic motors, town and village lighting systems, sounding and boring machinery; and lumbermen's machinery. He also requests the names of standard books on rural engineering and hydraulics.

Electrical Apparatus and Equipment (30,399).—A merchant in France desires to secure an agency for the sale of electrical apparatus and equipment, such as bells, electric light accessories, telephone equipment, and switchboards. Correspondence should be in French. References.

Lighting Plants, Fans, Turbines

(30,404).—Iron and steel sheets (plain black, corrugated black, plain galvanized, corrugated galvanized); hydraulic tobacco baling presses suitable for baling tobacco for export; electric lighting plants, electric fans (table, wall and ceiling), especially single-phase, 3-cycle, 115-volt ceiling fans; and hydraulic turbines, are required by a firm in India. Quotations should be given f. o. b. New York. Payment, telegraphic transfer on New York with order. Reference.

Condensers and Coolers, Pumps (30,410).—An engineer in Belgium desires to secure the representation of firms exporting absorption towers, air compressors, autoclaves, beet-sugar machinery, blowers, centrifugal separators, and grain separators, centrifugal nitrators, surface condensers and coolers, jaw crushers; roll, ball, and tube crushers and grinders; rotary cutters, driers (especially vacuum driers); vacuum separators, filters and filter presses; rotary heating furnaces; pumps of all types for industrial purposes; belts, chains, and other conveyors; and hoists and cranes. Correspondence may be in English.

Electric Tools, Etc. (30,411). — A firm in Spain desires to purchase screw-cutting engine lathes, back geared power feed milling machines, machine tools of every description, small engineering tools, steel split pulleys, balata and leather belting, wood split pulleys, shafts for transmission of power, electric and pneumatic tools, and grease cups and valves of every description. Correspondence may be in English. References.

Motors (30,425).—A company in Belgium seeks the representation of a firm manufacturing electrical installations, electric motors, and accessories. Correspondence should be in French. References.

Electrical Equipment (30,430). — A merchant in Algeria wishes to secure an agency for the sale of electrical equipment, motors and accessories, and dynamos. Quotations should be given c. i. f. Algeria. Correspondence should be in French. Reference.

Electrical Appliances (30,444). — A Scandinavian firm desires to secure an agency for the sale of tools, motors, motor boats, electrical appliances, glass and construction materials. Correspondence may be in English. Reference.

Electrical Appliances (30,448).—A firm in New Zealand desires to secure an agency for the sale of hardware, novelties, fancy goods, electrical appliances, telephone (manual and automatic) accessories, etc. Quotations should be given c. i. f. New Zealand or f. o. b. some port of shipment. Terms, cash against documents. References.

PROPOSALS

Electrical Fixtures.—Bids will be received by R. L. Brown, 605 Union Trust building, Parkersburg, W. Va., to install electrical fixtures in $60,000 moving picture theatre.

Street Lighting Equipment.—Bids will be received Sept. 2 at Cloquet, Minn., for installing street lighting equipment. Address J. A. Parks, city clerk.

Street Lighting System.—Bids will be received at Dell Rapids, S. D., on Sept. 9, for installing a street lighting system.

Electric Light Plant.—The Department of Interior Office of Indian Affairs, Washington, D. C., will receive bids Sept. 18 for an electric lighting plant at the Standing Rock School, N. D. Address Commissioner Cato Sells, Department of the Interior Office of Indian Affairs, Washington, D. C.

Electric Passenger Elevator.—Bids will be received at Chicago Sept. 12 for remodeling an electric passenger elevator in the United States Marine Hospital in accordance with plans at the office of the custodian, Chicago. Address James A. Wetmore, Washington, D. C.

Generators, Lighting Fixtures, Etc.—Bids will be received until 8 p. m., Sept. 4, at Hollandale, Miss., for furnishing materials, equipment and supplies and constructing certain water and light plant improvements for the town, in accordance with plans and specifications on file at the office of the board of aldermen, Hollandale, Miss. The work includes furnishing cast-iron and galvanized pipe and fittings, fire hydrants, valves and boxes, oil engine and deep well pumping set, electric generators, switchboard and street lighting fixtures. J. A. McAlpin, mayor; Xavier A. Kramer, consulting engineer, Magnolia, Miss.

Pump.—The Treasury Department, supervising architect's office, Washington, D. C., will receive bids until Sept. 12, for motor-driven triplex pump in the United States Postoffice at New Haven, Conn. Specifications are on file in the office of the architect and of custodian at New Haven.

Boiler and Transmission Equipment.—Bids will be received by the Consolidated Creamery Co., Fultonville, N. Y., for replacing engine, boiler and transmission equipment which was recently destroyed by fire.

Generator and Equipment.—Bids will be received by the city of Ashtabula, Ohio, until Sept. 10, for installing a 1000-kw. generator and equipment in the electric light plant, at an estimated cost of $50,000. Morris-Knowles, Jones Law building, Pittsburgh, engineer.

INCORPORATIONS

New York, N. Y.—J. S. Lawson & Co., Inc. Capital, $10,000. To manufacture electrical devices. Incorporators: John A. Potter, Allen D. Stanton and John S. Lawson, Briarcliff Manor, N. Y.

New York, N. Y.—Monroe Electric Supply Co. Capital, $10,000. To manufacture flashlights and electrical novelties. Incorporators: Samuel Feiner, Joseph A. Herman and Jacob Weiner, 5521 56th street, Brooklyn.

New York, N. Y. — L. Sence & Sons, Inc. Capital, $20,000. To manufacture electrical specialties. Incorporators: A. L. Naze, A. E. Bringle and A. McMahon, 1400 Broadway.

Hoboken, N. J.—Hudson Electrical Supply & Equipment Co. Capital, $50,000. To operate as electrical engineers, manufacture electrical equipment, etc. Incorporators: A. T. Pupke, Hoboken; W. E. Stanton and W. J. Coleman, Jersey City.

Jersey City, N. J.—British-American Rotary Valve Co. Incorporated in Delaware with capital of $1,500,000. To manufacture engines, etc. Incorporators: Edward Eriksen, Sr., and Jr., and Harry Eriksen, all of Jersey City.

Delray, Fla.—Delray Utility Co. Capital, $10,000. To operate a local electric light and power system. D. K. Carter, principal incorporator.

Wilmington, N. C.—J. W. Blake Electrical Co. Capital, $50,000. To manufacture electrical supplies. Incorporators: J. W. Blake and C. F. Jones.

Elkhart, Ind.—Mann Electric Co. has been incorporated with capital of $10,000 by Vernon V. Mann, Fred Lemon and W. W. Long.

Evansville, Ind.—Gilmore M. Haynie & Co. has been incorporated with capital of $20,000 to manufacture and install motor driven power and lights plants and systems. The directors are Gilmore M. Haynie, Isidor Kahn and M. S. Haynie.

Leopolis, Wis.—Leopolis Electric Light & Power Co. has incorporated with a capital of $5000. Incorporators: Rudolph Kucksdorf, James Cervey and others.

Middlesboro, Ky.—Davis Electrical Repair & Sales Co. Capital, $10,000. To operate a local plant for the repair of electrical appliances, etc. J. H. Martin is the principal incorporator.

St. Louis, Mo.—Western Battery & Manufacturing Co. Capital, $5,000. To manufacture electric batteries and kindred specialties. Fred A. Andreas is the principal incorporator.

New York, N. Y.—A. S. Elliott Co., Inc. Capital, $40,000. To manufacture electric and gas fixtures, etc. Incorporators: S. Elliott and A. G. and S. Lichtenstein, 138 East 11th street.

Sisterville, W. Va.—West Virginia Light, Heat & Power Co. Capital, $75,000. To operate a local light, heat and power plant. Incorporators: T. C. Davidson, A. R. Ten Broeck, and A. D. Lord, New York.

Loretto, Mich.—Loretto Light & Power Co. has incorporated with a capital of $10,000, producing and supplying electricity for light, power. Incorporators, C. H. Baxter, A. R. Parkett and others.

Detroit, Mich.—Detroit Transmission Co. Incorporated under Delaware laws with a capital of $10,500,000. Incorporators: Charles L. Marshall, Charles W. Kuehl, and James I. Butcher, Detroit.

East Liberty, Ohio—Peoples' Light & Power Co. has incorporated with a capital of $20,000. L. E. Traul.

Personal

H. M. Giles New Superintendent of South Philadelphia Works, Westinghouse Co. — D. R. Smith Promoted

A. H. NICKERSON, formerly connected with the Adapti Co., has been appointed representative of the Pierce Fuse Corp., with offices located at 310 Lennox building, Cleveland, Ohio.

C. B. LORD, has resigned as general superintendent of the Wagner Electric Mfg. Co., St. Louis, to become consulting mechanical engineer for the company.

E. B. SMITH, auditor of the Muskogee Gas & Electric Co., Muskogee, Okla., has been transferred to the Oklahoma City office of the Oklahoma Gas & Electric Co., and will be succeeded by George H. Richardson of the Oklahoma company.

R. TIMMERMAN, formerly division manager for the Utah Power & Light Co., Bingham, Utah, has returned after two years' service as a lieutenant in the Navy, and will have charge of the Provo Division of the company, succeeding A. P. Merrill, who has been transferred to the Ogden Division.

JAMES R. KEARNEY, for the past 14 years connected with W. N. Matthews & Brother, is now western manager of the line material division of that company, with headquarters at Chicago. He will cover all of the territory west of Pittsburgh, and Canada from Winnipeg west, supervising the line-material division sales and take charge of all salesmen covering that territory.

C. H. GROVE, who was recently discharged from the Navy, has been appointed Toledo representative for the Commercial Electric Supply Co., Detroit, Mich. Mr. Grove is a graduate of the 1911 class of the University of Illinois, and has been employed by the Westinghouse Electric & Manufacturing Co. on its apprenticeship course and in its sales department at Chicago.

J. E. DAVIDSON, vice-president and manager of the Nebraska Power Co., Omaha, Neb., is retiring from the office of president of the Nebraska Section of the National Electric Light Association, and will be succeeded by T. H. Fritts, of Grand Island, Neb. Mr. Davidson was formerly vice-president and general manager of the Pacific Power & Light Co., and well known to the men of the electrical industry in the West.

EDWARD N. LAKE, recently elected president of the Lake Engineering Co., was formerly manager of the Krehbiel Co., consulting engineer, Chicago, and prior to that time was resident engineer with Stone & Webster. During the war Mr. Lake was in service with the United States Army as a major in the construction division, Quartermaster's Corps. The major portion of his time in the army was devoted to the work of the construction division at the Scituate Proving Grounds, Scituate, Mass.

LEO VALENTINE, formerly chief electrician of the Oklahoma Gas & Electric Co., Oklahoma City, has been placed in charge of the electric department.

H. L. COLEMAN, formerly general manager of the Empire Gas & Electric Company, Geneva, N. Y., has resigned to become general manager of the Bloss Vein Coal Co., recently organized.

LOUIS E. STROTHMAN, manager of the steam turbine and pumping engine department of the Allis-Chalmers Manufacturing Co., Milwaukee, has resigned to become associated with the Richardson-Phenix Co., Milwaukee, as vice-president and general manager.

MAJ. J. R. WORTH, Construction Division, U. S. A., is now stationed at Pittsburgh, Pa., % West Penn Power Co., Beedeedum Trees building, as Government constructing quartermaster for three steam-electric plants. He will probably remain about a year.

R. L. PETERMAN, superintendent of the Pennsylvania Utilities Co., a property under the management of the W. S. Barstow Management Association, has been appointed general manager of the Binghamton Light, Heat & Power Co., succeeding Robert N. Hodgson.

R. O. BENTLEY, formerly in charge of the Newark district of the Public Service Electric Co., Newark, N. J., has been appointed division superintendent of the Essex Division, formed by a combination of the Newark and Orange districts. RUDOLPH BURKHALTER, formerly superintendent of the Orange district, has been made division superintendent of the Southern Division, succeeding J. Howard Sturge, who becomes Division Superintendent of the Bergen Division. WILLIAM B. HARTSHORNE, heretofore in charge of the Bergen Division, has been appointed to a like position in the Central Division, succeeding Jacob T. Barron, who has recently been appointed superintendent of production, with office at Newark.

DORSEY R. SMITH, for more than 15 years associated with the Consolidated Gas, Electric Light & Power Co., Baltimore, Md., has been appointed to head its merchandise and domestic sales department. Since entering the employ of the company he has successfully held various positions, the first being that of an outside salesman selling gas-consuming appliances. Upon the merger of the gas and electric companies Mr. Smith was placed in charge of the incandescent lamp department of the electric division. Six years ago when the company inaugurated a merchandising business of gas and electric appliances, table lamps and kindred products, he was appointed assistant to the manager of the merchandise department.

ROBERT N. HODGSON, general manager of the Binghamton (N. Y.) Light, Heat & Power Co., has tendered his resignation to accept the position of sales manager of the W. S. Barstow Management Association, which controls the Binghamton Light, Heat & Power Co. and 22 similar companies. Mr. Hodgson will make his headquarters in New York and will have charge of the commercial end of the association's business.

HARRY M. GILES has been appointed general superintendent of the South Philadelphia Works of the Westinghouse Electric & Manufacturing Co. Mr. Giles, who succeeds the late Oscar Otto, has risen from the ranks in the Westinghouse organization. For a number of years past, he has been superintendent of marine erection, a position to which he was appointed by H. T. Herr, when the electric company absorbed the machine company. Mr. Giles was born in Boothby, Maine, March 23, 1869, and when a small boy his parents moved to Providence, R. I., where he received his education. Leaving high school, he went to work at an early age in the shops of the Corliss Steam Engine Co. While working he took a night course in the Rhode Island School of Design and later received private instruction in mechanics, kinematics and mathematics. His close application to work in the Corliss shops won him rapid promotion as a draughtsman but he irked to get into the actual work of machine construction. He accordingly apprenticed himself in the mechanical department. During his apprenticeship he worked on the very lathe on which had been turned the turret rings of the "Monitor," that tiny Federal mosquito that whipped the Confederate cruiser "Merrimac" at Hampton Roads during the Civil war. Upon the expiration of his apprenticeship, he began to forge ahead in machine construction until in 1900 he became superintendent of Corliss engines with the Westinghouse Machine Co., a position he held until the company became a part of the present organization.

Obituary.

HENRY A. REED, who was operator in the first telegraph office opened on the Harlem Railroad in 1850, died at the age of 90, Saturday, August 23, in his home at Newark, N. J. He was overcome by the heat on the Fourth of July and had been ill ever since. Mr. Reed was president of the Bishop Gutta Percha Co. of New York. When he was 18 years old Mr. Reed took up what was then the new science of electricity and was one of the earliest telegraph operators in this section of the country and a pioneer manufacturer of insulated wires and cables. He was an organizer of the Electric Club and of the Electric Trade Society of New York.

For the Readjustment Period—What?

L.

Stimulating Production Essential

Following the stressful times of war, many people are inclined to underestimate the difficulties of post-war problems and to desire a cessation of government interference with business. Serious-minded people think official control, based upon economically sound legislation, seems imperative until more normal conditions have been reached. The general checking of exports does not necessarily bring about reduced cost of living. Our supply of various staple products and manufactured goods is sufficient to serve the legitimate needs of consumers here and abroad. In case of inadequate supplies, export embargoes—total or in part—should be promptly considered for the protection of the American consumer.

Above all, co-operation between labor and capital is necessary to bring about deflation. The problem cannot be solved by labor accusing capital of universal profiteering or by capital, in turn, decrying the demands of labor for higher wages. Stimulation of production is essential. Strikes only hamper the nation's power to produce, with disastrous consequences for all concerned. Investigations now being made by authorities will tend to establish a clear distinction between real and so-called profiteering; and, to put a stop to the hoarding of supplies, severe measures are predicted to reduce prices from levels arbitrarily maintained by speculation.

The reduction of most commodity prices will have to be gradual, as sudden reductions by the establishment of official maximum prices might cause undeserved losses to capital, which can only result in capital being withdrawn to the detriment of production.

NATIONAL PARK BANK OF NEW YORK

This essentially fair and clear-cut statement by one of the most progressive—yet conservative—banks of the country, is one which summarizes present needs better than any that has thus far come to our attention. For the electrical industries it has special significance.

C. A. TUPPER *Presiden*
INTERNATIONAL TRADE PRESS, INC., CHICAGO

Financial News

Foreign Credit Plan Vital.

Charges in a letter from Senator Owen of Oklahoma, member of the senate banking committee, that the New York banks have opposed bills pending in congress intended to relieve the drop in the foreign exchange market and to promote the extension of foreign credits, because their passage would deprive the banks of the opportunity to speculate in foreign exchange, were denied by local bankers. "The statement in Senator Owen's letter to the President is unfair," said E. D. Hulbert, president of the Merchant's Loan & Trust Co. "Bills now pending on the subject," continued Mr. Hulbert, "might, if enacted, take away from the banks their foreign exchange business and vest it in some one or more of the various organizations or governmental agencies proposed in the bills. It is for this reason that pending bills are generally opposed by bankers."

There was a general concurrence of opinion among bankers in Senator Owen's statement in the letter to the President, that unless immediate steps are taken to extend credits to cover European purchases in this country a serious business reaction will take place here, cutting off a large part of our foreign market.

"We are in the unique position of having nearly all of the world's money, as well as large stores of goods that are absolutely necessary to Europe," said Mr. Hulbert, "and the only way we can aid Europe is to extend credit for the purchase of our goods. Such action on our part would be beneficial to us in that it would aid us in getting rid of surplus manufactures and would unquestionably stabilize foreign exchange. The Davidson plan, a practical, workable plan that would have accomplished this result, was submitted before the situation developed its present acute form, and since it has been rejected by the administration no adequate substitute has been offered therefor."

Standard Gas & Electric Liquidates Back Dividend.

Directors of Standard Gas & Electric Co. in meeting yesterday declared the regular quarterly 2% cash dividend on the preferred stock payable Sept. 15 to stockholders of record Aug. 30, and passed a resolution providing for the payment of 13% cumulated dividends on the preferred payable in common stock of the company at par.

The operating statement for the first six months of 1919 shows the full 4% for the preferred and 3.52% on the common shares, including the increased common stock due to payment of the accumulated dividends on the preferred. This is at a yearly rate of 8% for the preferred and over 7% for the common, without taking into consideration any earnings from the Shaffer Oil & Refining Co., which company, the directors state, is progressing most satisfactorily.

Earnings statement of Standard Gas & Electric Co. for the first six months of 1919 is as follows:

Earnings after deduction of operating expenses and estimated Federal taxes	$1,377,011.04
Interest charges	486,645.73
Balance	$ 890,365.31
Preferred dividends	443,961.12
Balance for 6 months of 1919.	$ 446,404.19

Oklahoma Company Redeems Bonds.

The Oklahoma Gas & Electric Co., through the Continental & Commercial Trust & Savings Bank, trustee, has called for all of its 6% debenture bonds, dated Oct. 1, 1912, outstanding. In accordance with the provisions of the trust deed, par and accrued interest as of Oct. 1, 1919, and a premium of 1% will be paid. Bonds and all interest coupons attached are to be presented at Continental & Commercial Trust & Savings Bank, Chicago, by Oct. 1, 1919, after which date interest on the bonds ceases. Of the original issue of $228,500 bonds, $102,000 are now outstanding.

Electric Companies in Big Merger.

W. S. Barstow & Co., New York, state that the Potomac Edison Co. has been incorporated to take over and to develop various properties in West Virginia and Maryland. This company will have a capitalization of $4,000,000 first mortgage bonds, $1,700,000 second mortgage bonds, $1,000,000 preferred stock and $3,500,000 common stock. It will take over the present properties of the Edison Electric Illuminating Co. of Cumberland, Cumberland Electric Railway Co., West Virginia Central Gas Co., West Virginia & Maryland Gas Co. of Maryland, West Virginia and Maryland Gas Co. of West Virginia, Maryland Gas Co., Hartland Power Co. and all of the electric light and power companies doing business in Grafton and vicinity.

Increased Valuation for West Virginia Utilities.

The State Board of Public Works, Charleston, W. Va., has issued a statement showing an increase of $3,802,989.77 in assessments of all public utility corporations in the state over the total of 1918. The aggregate assessments for the present year are $349,558,319.97. In the case of electric light and power interests, large increases have been made in the case of a number of prominent companies, as follows: Appalachian Power Co., from $1,450,000 to $2,500,000; Consolidated Light, Heat & Power Co., $800,000 to $1,100,000; Logan County Light & Power Co., $750,000 to $1,250,000; and the Virginian Power Co., from $2,000,000 to $2,250,000.

The Asia Banking Corp. announces the appointment of W. G. Avery as general manager of its Far Eastern branches, with headquarters at Shanghai. Mr. Avery, who was formerly assistant treasurer of the Guaranty Trust Co. of New York, left New York Aug. 19, and will sail from Vancouver on Sept. 4.

Southern California Edison Offers Stock.

The Southern California Edison Co. is offering to its stockholders 25,000 shares of common stock at $90 cash, or $91 payable $6 with subscription and $5 a month. Stock not subscribed will be offered publicly after Sept. 1. The company plans to expend $20,000,000 in hydroelectric developments in the next three years.

Dividends.

American Telephone & Telegraph Co. has declared a quarterly dividend of $2 a share, payable Oct. 15 to stock of record Sept. 20.

American Power & Light Co. has declared the quarterly dividend of 1%, payable Sept. 1 to stock of record Aug. 21.

El Paso Electric Co. has declared a quarterly dividend of $2 50 a share, payable Sept. 15 to stock of record Sept. 2.

A dividend of 1¾% on preferred stock has been declared by the Nebraska Power Co., payable Sept. 1 to stock of record Aug. 20.

Northern Texas Electric Co. has declared a quarterly dividend on common stock of 2%, also a dividend on preferred stock of 3%, payable Sept. 2 to stock of record Aug. 18.

Philadelphia Electric Co. has declared a quarterly dividend of 43¾ cents per share, payable Sept. 15 to stockholders of record Aug. 20.

The board of directors of the Rochester Railway & Light Co. has declared a quarterly dividend of 1¼% on preferred stock, also a quarterly dividend of 1¾% on series B preferred stock, both payable Sept. 2 to stock of record Aug. 25.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotatons furnished by F. M. Zeller & Co., Rookery Bldg., Chicago.

Public Utilities.	Div. rate. Per cent.	Bid Aug. 19.	Bid Aug. 26.
Adirondack Electric Power of Glens Falls, common	6	12	13
Adirondack Electric Power of Glens Falls, preferred	6	75	78
American Gas & Electric of New York, common	10+extra	122	120
American Gas & Electric of New York, preferred	6	41	41
American Light & Traction of New York, common	..	228	220
American Light & Traction of New York, preferred	6	95	95
American Power & Light of New York, common	4	60	62
American Power & Light of New York, preferred	6	69	68
American Public Utilities of Grand Rapids, common	..	10	10
American Public Utilities of Grand Rapids, preferred	7	30	30
American Telephone & Telegraph of New York	..	101	102
American Water Works & Elec. of New York, common	..	5½	5¾
American Water Works & Elec. of New York, particip	7	10	10
American Water Works & Elec. of New York, first preferred	..	58	58
Appalachian Power, common	..	5	5
Appalachian Power, preferred	7	22	22
Cities Service of New York, common	+extra	434	438
Cities Service of New York, preferred	6	76¼	75½
Commonwealth Edison of Chicago	8	107	107
Comm. Power, Railway & Light of Jackson, common	..	25	23
Comm. Power, Railway & Light of Jackson, preferred	6	57	56
Federal Light & Traction of New York, common	..	10	10
Federal Light & Traction of New York, preferred	..	46	47
Illinois Northern Utilities of Dixon	6	75	75
Middle West Utilities of Chicago, common	2+extra	30	30
Middle West Utilities of Chicago, preferred	6	53	53
Northern States Power of Chicago, common	..	65	67
Northern States Power of Chicago, preferred	ex.div.7	89	90
Pacific Gas & Electric of San Francisco, common	..	66¾	66¾
Pacific Gas & Electric of San Francisco, preferred	6	88	88
Public Service of Northern Illinois, Chicago, common	7	86	86
Public Service of Northern Illinois, Chicago, preferred	6	94	94
Republic Railway & Light of Youngstown, common	4	15	13½
Republic Railway & Light of Youngstown, preferred	6	50	50
Standard Gas & Electric of Chicago, common	..	31	31
Standard Gas & Electric of Chicago, preferred	8	45	45½
Tennessee Railway, Light & Power of Chattanooga, common	..	5	3½
Tennessee Railway, Light & Power of Chattanooga, preferred	6	15	15
United Light & Railways of Grand Rapids, common	4	45	43
United Light & Railways of Grand Rapids, preferred	6	72	68
Western Power of San Francisco, common	..	24½	24½
Western Union Telegraph of New York	extra	85½	86¾
Industries.			
Electric Storage of Philadelphia, common	4	83	94
General Electric of Schenectady	8	162¾	162¼
Westinghouse Electric & Mfg. of Pittsburgh, common	7	52	52¾